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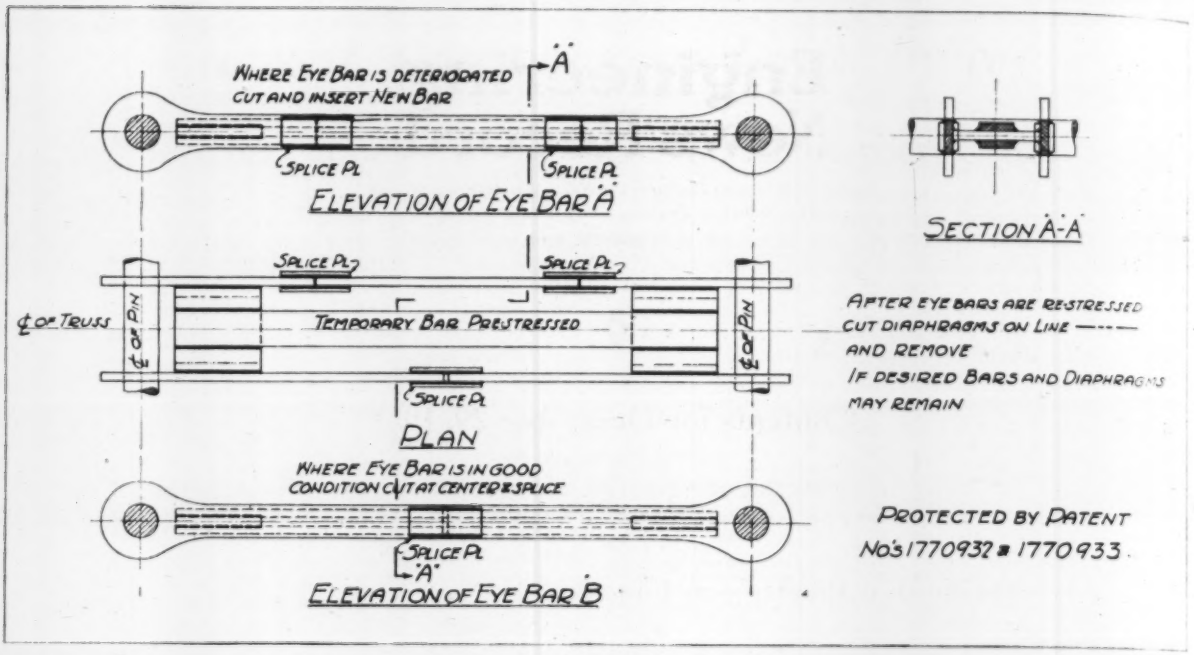
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The Road of Progress

CONSTRUCTION faces critical conditions. We pointed out the situation on this page last week and said that the remedy lay in building the construction industry into an organized unit. The Highway and Building Congress meeting next month in Detroit is the gathering logically to undertake this marshaling of construction forces and to send them into action. It should enter upon the task with enthusiasm and vigor.

THE INDUSTRY has two things to do: first, to combat the forces which are attacking and seeking to weaken its resources; second, to align its own ranks and set about to correct its internal weaknesses. Both constitute continued tasks, not merely an emergency undertaking, but they are of such exceptional importance under the conditions of the moment as to demand instant action.

IN ORDER to meet and turn back the attack upon construction, the industry needs to know itself and the essential value of its function. It needs to obtain data on the cost and the value of what it builds; on ways and means of setting up well-ordered construction programs, both in industry and in government; on the productiveness of the works which it creates, and on how this productiveness is related to taxes and operating cost. In short, it needs to compute exactly the economic place of its service to the community. Today it has no such information by which it can sell construction to its clients or strengthen its own faith in the character of its service.

AS TO the second point, the industry's internal troubles, much is known and many opinions prevail. Discussion at the recent construction conference in Washington centered on some of the ills, among them unsound internal relations, bad bidding practices, mutual exploitation by contractor and subcontractor. There are many others, and in no case do they affect only a single group. The stone producer depends on stable volume of construction in exactly the same way as does the engineer or the architect. All groups depend for their business to a great extent on how cheaply they can render the complete construction service; and if defective practices in the stone or the brick industry raise the cost of construction, there will be less call for the services of engineer and architect. The industry as a whole has an important internal problem.

SEVERAL distinct steps are necessary for progress. The first is to bring about recognition by all groups of unity as the dominating need. Second is provision of adequate financing to make the effort continuous and aggressive. Third is the matter of organization—to apply the industry's forces in such manner as to obtain all the facts for correlating its service with the public interest. Fourth and last is the matter of setting up machinery to humanize and adjust the industry's internal problems.

A FOUNDATION has already been laid, for the nucleus of an organization for unity exists in the Construction League. That body has large potentialities, but it is not yet so shaped as to embrace all ranks or enlist the necessary resources of money and man power. It can be so organized.

BUT how the organization shall be shaped is for the congress to determine. Enough of the unit groups in the industry will be there, all of them sufficiently conscious of the critical problems of the present time to supply both full understanding of the organizing task and adequate force of conviction to carry it out. Thus they have manifest opportunity to cooperate in unity of purpose and action. THE EDITORS.

Off-Rail Union Terminal Built in New York

Port of New York Authority builds a station on Manhattan Island for joint use of eight railroads as clearing house for less-than-carload shipments—All movements of freight in and out of the terminal are by truck

THE FIRST large-scale experiment in handling less-than-carload freight in and out of Manhattan Island was begun on Oct. 3, when the Port of New York Authority tendered a new off-rail freight terminal to the eight railroads that have agreed to make joint use of the facilities provided therein. This terminal is located in the lower floors of the Port Authority's new Commerce Building in the block between 15th and 16th Sts., 8th and 9th Aves., New York. It is the first of a number of similar terminals projected by the Port Authority for improving freight-handling within the New York metropolitan district by cutting down the trucking now required for the delivery and receipt of freight at the individual pier stations of the railroads on the Manhattan waterfront.

Conditions to be met

The new terminal, known as Inland Terminal No. 1, is unique among railroad freight-handling facilities in the country in that it is a union off-track railroad freight station for exchange of less-than-carload freight between shippers and the eight principal railroads serving New York. Nowhere has such exchange been attempted on so large a scale. This fact made the selection of the site and the design of the terminal a particularly difficult problem. Governing conditions in selection of the site were its convenience to the largest possible number of shippers and ease of access to rail terminals by ferries and the Holland Tunnel. Other elements that had to be considered were the cost of a site of a size adequate for such a terminal and subsurface conditions that might add materially to construction costs. A further factor introduced by high land values on Manhattan Island was the suitability of the site for a commercial building, for it was obvious from the start that a freight terminal alone with ample berths for vehicles directly accessible to the streets could not be justified economically on such high-cost land. As the result of this latter consideration, the terminal as built, called the Commerce Building of the Port Authority, is in effect two buildings—a freight station, consisting of a basement and ground floor, surmounted by a commercial building fifteen stories high, or sufficient to make the building as a whole "self-liquidating."

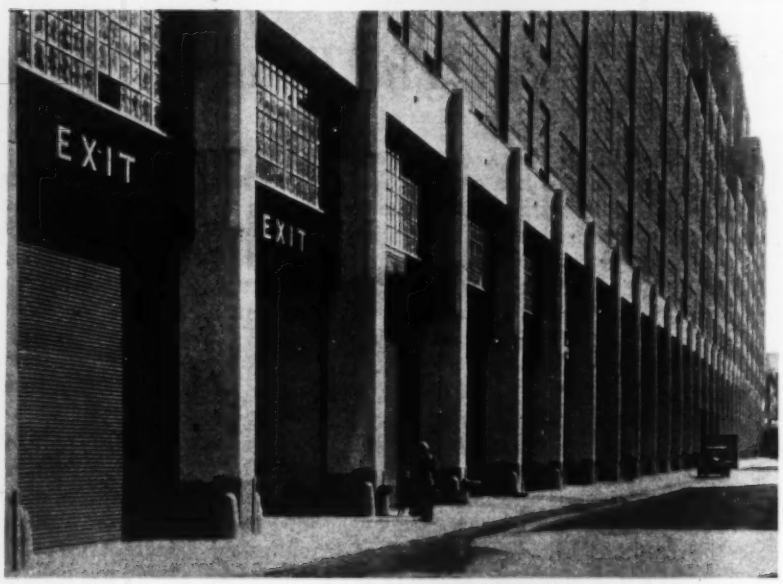
Costly freight-handling

Under conditions which existed when the studies for union inland terminals were being made, a manufacturer on Manhattan Island having less-than-carload shipments going to two or more railroads had to send his trucks to one of the pier stations of each railroad, and at each station the truck driver was required to go through the slow process of having his shipping invoice verified. Incoming shipments had to be collected by the tedius process of getting onto the pier with the truck, locating the shipment, loading it and getting off the pier again, the truck having to make the rounds of several individual pier stations.

Where no "direct-package" cars were set up, outgoing shipments delivered to the railroad pier stations were loaded into "trap cars" on car floats lying alongside the pier stations. When these cars were loaded, the floats were moved across the river to the New Jersey shore, the cars then being taken off the float and moved to a transfer station where the individual shipments were taken out of the "trap cars" and consolidated into package cars for specific destinations.

Under the new plan that has been initiated, a manufacturer on Manhattan Island takes all his shipments to one of the union inland terminals, where he turns them all over to the terminal agent in one operation. The terminal agent then segregates the shipments according to the railroads over which they are to move and delivers them to the several railroads within the terminal for consolidation into truckloads, which are moved to the railheads by ferry or through the Holland Tunnel.

The advantages claimed for this new system when in full operation are a material reduction in the time required for the collection and delivery of freight on Manhattan Island, a material reduction in street traffic, a reduction in cross-river traffic though the elimination of a portion of car-float movement, the release of valuable riverfront property now used by the railroads for pier stations, and the elimination of an appreciable amount of switching on the New Jersey side of the river. When the complete union inland terminal plan is consummated, the railroads stand to gain through reduced operating costs and the release of property for which they now pay high rentals or high taxes; but the transition period will augment rather than lessen their expenses, because existing facilities cannot be abandoned immediately, and new equipment and new construction made necessary in adapting their properties to the new program must be provided before the old facilities are given up.



The inland freight terminal occupies the basement and ground floor of the Port of New York Authority's new Commerce Building. In the accompanying picture of the 15th St. side of the building the exit ramps from the basement and second floor are at the left, and beyond are truck berths inside the building line.

It is estimated that the additional cost to the eight railroads participating in the new terminal will be $750,000 for the first year.

Commerce Building

The Commerce Building occupies the entire block bounded by 8th and 9th Aves. and 15th and 16th Sts. It is a modern fireproof structure approximately 200 ft. wide and 800 ft. long, sixteen stories high, with setbacks to comply with the city building code, and penthouses at the ends and center for elevator machinery, standpipes, sprinkler tanks and electrical distribution system. The frame is of steel and reinforced concrete, and the exterior walls are of selected common brick and limestone with terra cotta copings and finials. A typical story height is 15 ft. floor to floor.

The basement and the ground floor, except for sections parallel to the 8th and 9th Ave. frontages, are leased to the railroads for the inland terminal. The upper floors, as noted previously, the Port Authority offers for lease for light manufacturing, show rooms, office space, etc. For the convenience of these tenants the building is equipped to supply steam, hot water, electric power and gas.

Service and passenger elevators for the upper floors are concentrated in the avenue ends of the building.

A notable feature of the elevator equipment serving all floors up to the fourteenth is a pair of truck elevators at each end of the building having platforms 17 ft. wide by 34 ft. long, a capacity of 40,000 lb. and traveling at a speed of 200 ft. per minute. They are believed to be the largest yet constructed for such service.

Adjoining the truck elevator shaft at each end of the building is a truck lobby 37x90 ft., with its floor sufficiently lower than the main floor to permit of direct loading. This lobby is sufficiently large to permit maneuvering and unrestricted berthing of 8 trucks—24 trucks may be berthed in the two truck lobbies on each floor, but they may not be maneuvered independently. Shaft openings also are provided to permit trucks to run directly onto each floor.

The freight terminal

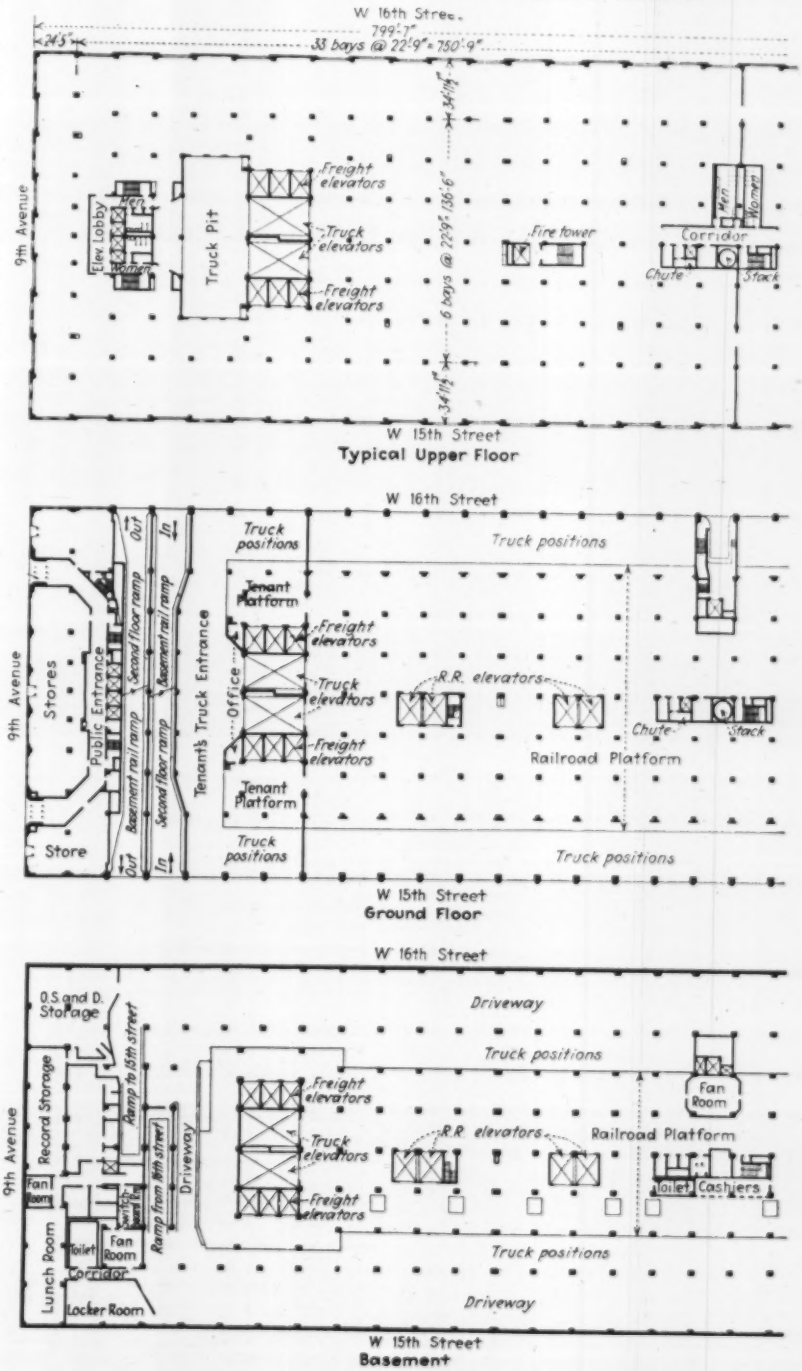
The basement and ground floor were reserved for the freight terminal in the design studies for the building. As built, ramps reaching to the second floor are included so that it may be dedicated to a similar use if required. This direct access to an unusually large floor area also makes the second floor attractive for commercial purposes.

Flexibility of use was a governing element in designing the freight terminal. Maximum berthing frontage free of interference with street traffic was accepted as a fundamental requirement, but beyond that the floors utilized for freight purposes had to be so arranged as to permit any of three operating schemes to be made effective with a minimum of change.

At street level, except for the areas at the avenue frontages occupied by stores and service facilities to the upper floors, the whole area is given over to a central loading platform with its face set back far enough from the building line on both the 15th and 16th St. forntage to permit trucks to back in clear of the street during loading. The platform is 3 ft. 6 in. high and slopes with the street grade, the elevation being 4 ft. higher at the east end. Along the center line of the building are eight baggage-type elevators, 10x17 ft. in size and of 12,000-lb. capacity, connecting the street platform with a similar platform in the central part of the basement. These elevators are of the underslung type to avoid encroachment on the rentable area of the second floor.

The basement of the building, except for the space required for elevator pits

Half plans of the two floors given over to the freight terminal and a typical upper floor. Except for minor details, the layout of the 8th Ave. end of the building is similar to that here shown.



The central loading platform in the basement is served on each side by wide truckways leading to ramps at each end of the building. Large baggage-type elevators connect the basement platform with the one on the ground floor. Mechanical ventilation is provided in the basement.

and other services, is used entirely for railroad purposes. It is reached by ramps at each end of the building. To provide wide driveways along each street frontage, the first line of interior columns is set back 35 ft. from the exterior wall. This results in an unusually wide span between the outer column lines and, in the upper floors, gives a wide floor area adjacent to the windows, a most attractive arrangement for manufacturing purposes.

When fully used, the following freight movement in the terminal is expected to be effective: Outgoing freight delivered on the 15th St. side will be unloaded and dispatched on platfrom trucks for delivery to the shuttle trucks of the individual railroads. Incoming freight from the railheads will be assembled alphabetically on the street-level platform, where the terminal agent will deliver it to the trucks at the 16th St. side of the building.

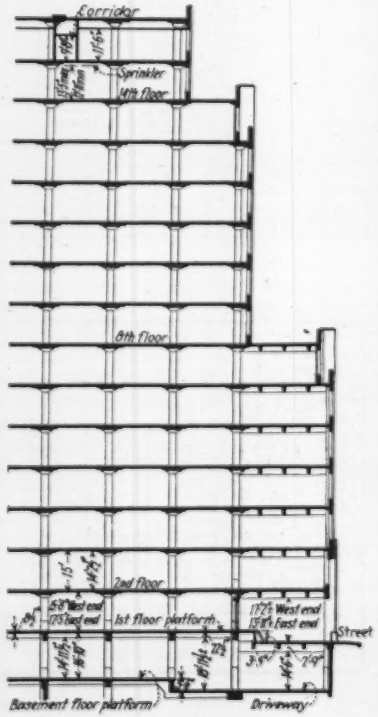
Structural details

The length of the building is divided into 35 bays of 22 ft. 9 in. between column centers. Its width is divided into eight bays, the outside or street bay being 33 ft. 6 in. between column centers and the six interior bays 22 ft. 9 in. The choice of a square interior panel simplified the structural framing, especially in the flat-slab portion of the building.

All framing on the first floor is of structural steel incased in concrete fireproofing, the beams and rolled girders being CB sections. The choice of steel framing was made in order to facilitate any future changes in ramps and driveways in case of a revision in the operating program.

Framing for the second and fifteenth floors is of several types. The 21 bays between the two groups of freight and truck elevators are of flat-slab construction with structural-steel column cores in the lower stories. The seven bays at each end of the building are designed with structural-steel framing because the nature of the floor space, broken up as it is with elevator and stair walls, with truck lobbies of rectangular shape and with the setback

Half section of the Commerce Building. The wide bay along the exterior wall was introduced to provide a wide truckway in the basement and is a notable feature of the upper floors of the structure.



walls, did not lend itself economically to a flat-slab layout. Wherever it was practical in these areas, reinforced-concrete beams were used instead of steel beams.

A notable feature of the design is the provision made for expansion and contraction. The first story is exposed to outside temperature for nearly its full length, and as a consequence it was decided that it was essential to divide the building into three isolated sections by expansion joints running across the entire structure and extending from the first floor to the roof. This required special provision to be made for expansion joints in the details of the limestone, brick work, terra cotta coping, roof flashing, floor construction and longitudinal plaster partitions to conceal the joints and make them watertight.

All structural roof and floor slabs are reinforced gravel concrete. The single-span slabs vary in thickness from 4 in. on the roof to 8 in. on the truck driveways and ramps. The basement driveway slab is on an earthfill. It is 8 in. thick, reinforced with 5-in. round rods 12 in. on centers both ways. The flat slabs are 8 in. thick on the roof and 9½ in. thick on the floors.

The live loads used in the design of the building are as follows:

	Lb. Per Sq. Ft.
Flat-slab portion of roof	100
Rest of roof	40
Typical warehouse floor	200
Driveways and truck areas on first floor and in basement:	
On beams	300
On girders	200
Axle load on slabs	24,000
Loading platforms	300
Penthouse floors	150

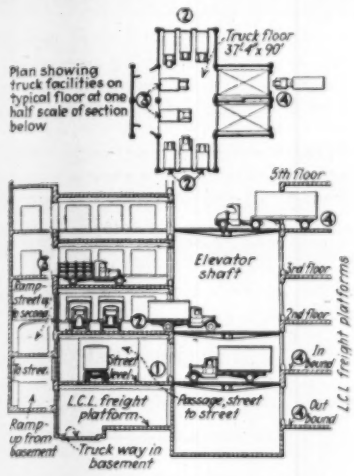
All foundation walls and column piers are of concrete carried down to hard rock. They are proportioned so as not to exceed a bearing load on the rock of 35 tons per sq.ft.

In order to provide clearance for the basement ramps, it was necessary to offset one of the heavy building columns at the second floor. This column, sup-

porting 1,572 tons, is carried on a pair of plate girders over a span of 22 ft. 9 in. The girders are coupled with pipe separators and through bolts and are completely incased in concrete fireproofing.

Lobbies for motor trucks

Truck lobbies, as previously noted, are located adjacent to the truck elevators on each floor up to the fourteenth. These lobbies are 38 ft. 3 in. wide and four bays long, with the bottom 3 ft. 6 in. below the general floor level. The floor of each lobby is supported on a series of steel beams 22 in. deep and 7 ft. on centers, incased in concrete. Spanning between these beams is a 6-in. concrete slab with a 1:1:2 mix



The truck elevators at each end of the building afford unusual service facilities for the upper floors.

having an ultimate strength of 3,000 lb. per sq.in. It is reinforced with ⅝-in. round rods 6 in. on centers. At the third points of the beams two 8-in. concrete diaphragm walls have been provided for the full length of the lobby. The beams have been pitched slightly so that the finished floor of the pit slopes toward the drain located on the side opposite the elevator shaft.

Other details of the design and construction are as follows:

1. The structural-steel column cores in the flat-slab portion of the building were erected in lengths of four-story heights (60 ft.), with temporary struts to hold them plumb until the capitals and flat slabs were poured (*ENR*, May 12, 1932, p. 692).

2. Steel forms were used for round concrete columns, and wood forms lined with fiber board were used elsewhere.

3. Anchor slots were provided in outside surfaces of column and spandrel concrete to hold the bond ties for the brick veneer.

4. When plate girders more than 3 ft. deep were required by the design, holes were punched in the web plate or stiffener angles of the girder so that ½-in.-diameter reinforcing rods could be wired securely to the steelwork. These rods, spaced about 2 ft. on centers in both directions, and a metal caging on the bottom flange insured the bond between the concrete fireproofing and the steel girder.

5. Wherever possible the floor framing was located on the center line of the columns. When this was impractical, full provision for eccentricity was made in the design of the column and in the size of the connection.

6. All beam connections to columns were arranged so as to be protected completely by the firepoofing.

7. The framing adjacent to elevator shafts was plumbed during erection so that the maximum variation from the vertical did not exceed ½ in.

8. All field connections for steel columns, bracing, elevator machine supports and elevator guide supports were field-riveted. Other field connections were bolted, except where excessive reactions or eccentricity precluded the possibility of using field bolts.

9. All structural-steel work that was to be permanently incased in concrete was shipped unpainted from the fabricating shop, except for milled surfaces and inaccessible surfaces. After erection and before placing the concrete forms, all rust and mill scale was removed by wire brushes.

The building has a volume of 38,000,000 cu.ft. and a combined gross floor area of 2,500,000 sq.ft. Its construction involved 24,000 tons of structural steel, 113,000 cu.yd. of concrete, 6,000 tons of reinforcing steel and 12,000,000 bricks.

Railroads using Inland Terminal No. 1 are the Baltimore & Ohio, Central Railroad of New Jersey, Erie, Lackawanna, Lehigh Valley, New York Central, New Haven and the Pennsylvania. It is operated by a board of managers, with C. W. Rau as agent.

The development of the plans for the building were in immediate charge of J. C. Evans, terminal engineer of the Port Authority, who had the cooperation of representatives of several railroads in connection with the terminal facilities.

The Port Authority retained the services of Abbott, Merkt & Co. as engineer-architects to design the structure and supervise its construction.

Foundations for the building were built by the Goodwin Construction Co., and the Turner Construction Co. acted as general contractor for the superstructure. The building, exclusive of site, cost about $8,750,000.

Arizona Publishes a Code for Guidance in Building Dams

REGULATIONS for the design and construction of dams in Arizona have been approved by the state engineer in the form of a 30,000-word building code. The bulletin supplements one issued in 1929 that outlined the required procedure for making application for approval of plans and specifications in accordance with the law of that year covering state regulation. The code was prepared by J. A. Fraps, engineer in charge of dams, under the general supervision of T. S. O'Connell, state engineer.

According to the foreword of the code, the purpose is to "compile pertinent sound data relative to design and construction, in the belief that such procedure will eventually result in dams of uniform safety and stability." It states, further, "this office has no desire to design dams, and is not permitted to do so under the authority granted by House Bill No. 188, but considers it necessary, from the viewpoint of efficient regulation, to issue a code for the guidance of the designing engineer. Certain theories of design have become obsolete in recent years, and have been superseded by more exact theories. Use of old methods of design can be thwarted by the issuance of a code which definitely states the methods of design considered adequate, and thereby secure more efficient and safer regulation. Construction methods also change, and experience often indicates that improper methods have been used in the past. A good design is worthless unless the structure is built in such manner as to secure the results contemplated in the design. This circular cannot attempt to include detailed specifications for the construction of all types of dams, but will set forth main items in a general way, which must be covered in detail by the specifications prepared by the applicant.

"This code for dams is not considered to be irrevocable. There are numerous features connected with design and construction that are considered questionable, and should be left open to discussion. In such cases, the state must necessarily be conservative, and the code may be more exacting in certain regards than might be desired by the designer or builder. The code is presumed to be flexible, however, and changes in design and construction will be inculcated as generally accepted theory and practice dictate.

"New designs, differing widely from those discussed herein, are not discouraged. They will receive the atten-

tion of this office, and are welcome, for new designs embodying sound engineering principles, and resulting in more economical structures, are needed for the development of power and irrigation projects."

Foundations and spillways

Taking up first the matter of foundations, the code covers the subject first in general and then treats specifically the requirements for various types of structures. The section emphasizes the need for adequate foundations as the first assurance of safety in dam building and emphasizes the need for exploration and the possibility that geological advice may be needed. Preparation of the rock foundation for concrete dams is outlined in some detail covering care in blasting, stepping of the foundation and cleaning. The section concludes with the rule that no concrete shall be placed on foundations or abutment rock until written approval of the state engineer has been secured.

On the subject of spillways, reference is made to inadequate spillways as a common source of dam failures and emphasizes the particular need for sufficient capacity in connection with earth and rockfill dams where overtopping is serious. No quantities of runoff per unit of catchment area are given in the code, and the general requirement is that the spillway shall pass the maximum probable flood. A minimum freeboard of 3 ft. is established, and a formula provides for the calculation of freeboards based on the length of the reservoir, which introduces the factor of wave size. Spillway gates are subject to the supervision and control of the state office. Proof of the functioning of automatic gates is placed on the applicant, and the final classification is to be decided by the state engineer.

Arch dams

In view of unknown factors in connection with definite analysis of arch-dam stresses, the code does not fix rules pertaining to arch design. The statements cover the principal elements of accepted practice, and the hope is expressed that they can be superseded soon when design methods have become more exact. Arch dams designed by the application of the cylinder formula will not be considered. The design method of the U. S. Bureau of Reclamation in the distribution of loads between arch and cantilever is considered acceptable.

Gravity concrete dams

"At the present time authorities disagree about the forces to be considered in hydrostatic uplift under a gravity dam." The code requirement, in the case of a positive system of drains, is for full uplift to be assumed upstream from the drains, and uplift equal to maximum backwater to be assumed over the remainder of the area. When drains are omitted a gravity dam shall be designed on the assumption that uplifts vary uniformly from 75 per cent of full hydrostatic pressure at the upstream face to tailwater head at the downstream face. The code suggests that possible modifications of uplift provision may be made when future investigations permit of more accurate estimate of upward pressures.

"The sliding factor has been given a great deal of attention in the past, but will not be a vital requirement of this office. It will be the policy of this office to lay great stress on proper foundation materials, preparation of foundations, including stepping, and placing of foundation concrete. If these requirements are satisfied in every particular, this office will not be exacting in the requirement of a low sliding factor."

Concrete

The weight figure for concrete is to be taken at 145 lb. per cu.ft., unless tests with material to be used in the structure indicate a different weight. Qualities of weather resistance, low shrinkage and imperviousness are stressed for concrete to be used in dams. Regarding heat of hydration, the code mentions the possibility of using a low-heat cement, leaving sections of the dam open temporarily to facilitate dissipation of heat. It closes by stating that the "entire problem is not fully solved and should receive further attention from designers and builders."

On the subject of stress allowance, a maximum figure of 650 lb. for concrete is specified, and the allowable stress is limited to 25 per cent of the ultimate crushing strength of the concrete at 28 days. Specifications for cement and steel are in accordance with accepted standards.

Construction operations are covered by sections on aggregate, proportioning of the mix, requirement of field laboratories and rules concerning forms and falsework. These sections of the code in general follow accepted procedure, and statements are in general terms. The use of chutes is not recommended for the placing of concrete in dams. The necessity for better curing methods is stressed.

Earth dams

A minimum crest width of 10 ft. is adopted for earth dams, and this is increased to 15 ft. for 100-ft. dams and 20 ft. for dams 150 ft. high. Side slopes vary with the height of the structure, and on dams from 40 to 100 ft. high they are not to be steeper than 2:1 downstream and 2½:1 upstream. All requirements for earth dams are based on the assumption of using good material, and requirements may be increased with the use of inferior fill.

Various methods of making earth dams impervious are discussed, and the general rule is suggested, in the case of a puddled section in the center of a dam, that the width of the puddle core equal its depth below the crest. The downstream faces of earth dams are to be protected from the wash of rain water, and at the toe from the discharge from outlets or spillways. Upstream faces can be protected against wave action with riprap or concrete slab.

Rockfill dams

Downstream slopes for this type of structure are not to be steeper than the actual angle of repose of the rock, and in no case steeper than 1.4:1. An upstream slope not steeper than 1.3:1 may be used when thin pervious facings of derrick-placed rock are used. Minimum crest widths for heights from 50 to 100 ft. are set at 12 to 16 ft.

"The type of rockfill dam recently adopted for several major structures is considered as well satisfying requirements of design." The thickness of the derrick-placed section is not specified. The code mentions the tendency to reduce the thickness in modern structures, as its chief function appears to be principally for providing a facing on which to pour the impervious slab. The use of a laminated facing slab and the greater flexibility of this type of facing is mentioned.

The code acknowledges the assistance of W. W. Lane, former state engineer, Fred A. Noetzli, Los Angeles, and others.

East River Bridge Traffic, New York City

According to the department of plant and structures, New York City, traffic counts on its four East River bridges show that there has been a net increase of 9,225 vehicles per 24 hours as compared with 1931; the respective totals are 229,142 and 219,917. The count also indicates that there has been a decrease in vehicular traffic on the Brooklyn Bridge of 601 vehicles and on the Manhattan Bridge of 6,039 vehicles, while at the Williamsburg Bridge there has been an increase of 4,789 vehicles and at the Queensboro Bridge an increase of 11,076 vehicles as compared with the 1931 figures. These changes indicate a movement of traffic from the two lower East River bridges, the Brooklyn and the Manhattan, to the two upper East River bridges, the Williamsburg and the Queensboro. In the case of the two lower East River bridges there has been a reduction of 7 per cent as compared with 1931, and on the two upper East River bridges an increase of more than 12½ per cent. The Port of New York Authority states that there has been a decrease of about 8 per cent in vehicular traffic through the Holland Tunnel under the Hudson River.

Principles and Practice in Welded Joint Design

Balancing theoretical and practical considerations in joint analysis, with procedure and formulas for beam connections and splices, column splices, truss joints and other details

By Gilbert D. Fish
Consulting Engineer, New York, N. Y.

SINCE an appreciation of the potential advantages of welding first penetrated the consciousness of structural engineers less than a decade ago, amazing progress has been made in adapting the process to the needs of the structural field. For the most part the art has developed under the direction of a group of men active as the structural welding committee of the American Welding Society. The test information and job experiences of these men and of others influenced by them have been effectively disseminated through papers read at the society's conventions and through accounts of work and research appearing in the technical press. These have constituted to date the literature of structural welding. No book has been available that summarized the state of the art and set forth in usable form its principles and proved practices. This unnatural situation is soon to be remedied by a book now in process of publication by the McGraw-Hill Book Co. Its author, Gilbert D. Fish, is among the most active and well-known of structural welding authorities and is responsible for many welded buildings for office, mill and institutional purposes, as well as for the only railway truss bridge that has yet been completely welded. The following article, taken from Mr. Fish's book manuscript, presents part of the data in the chapter on welded connections. Representing as it does the first published account of practical weld-connection analysis, the article is an important contribution to structural welding knowledge. —EDITOR.

A STRUCTURAL DESIGNER whose experience has not included welded construction is unlikely to realize at first what a wide variety of welded joints is available. This wide choice increases opportunities and makes it possible to develop many useful designs for which riveting offers no counterparts, but it also makes standardization more difficult and imposes a higher order of technical duty upon the detailer. For some classes of welded structures a far greater skill is required for detailing the joints than for designing the members.

End connections of beams are the most numerous joints in building construction, and they account for more than half the total welding used in framed structures. Beam splices, column splices, connections for brace members, roof truss connections, and gusseted joints for bridge trusses and heavy building trusses are other commonly occurring details. A few typical cases will be considered in this article. Where formulas occur the dimensions are in inches and forces are in thousands of pounds.

In general, it may be stated that fillet welds of less than ¼-in. size are not ordinarily used except along edges of plates or flanges less than ¼ in. thick. The length of a fillet subject to longitudinal stress should generally be at least four times the weld size.

Beam resting on support

Fig 1 shows I-beam purlins resting on a sloping rafter. The vertical roof load P may be considered to be resisted by the system of forces shown, of which the central force $P \cos \alpha$ and the lower force $PA \sin \alpha B$ of the couple can be disregarded in designing the welds. The lower weld sustains only the transverse stress $\frac{1}{2} P \sin \alpha$, while the upper weld sustains two transverse stresses $\frac{1}{2} P \sin \alpha$, and $PA \sin \alpha B$ at right angles to each other, and is designed for their resultant $P \sin \alpha \sqrt{\frac{1}{4} + \frac{A^2}{B^2}}$

The assumption made concerning the system of forces is inaccurate because it does not properly account for the indeterminate distribution of compression, but it is nearly correct for steep slopes, while for slight slopes it errs on the safe side but not enough to cause a considerable waste of welding.

Fig. 2 shows a beam continuous across the top of a supporting column. Means for bolting or clamping the members to facilitate erection might be needed but are not shown. Let the vertical load be P maximum and P' minimum, and let the maximum wind-bending moment be $\pm M$. The horizontal shear due to wind can generally be ignored without considerable error in designing a joint, provided the bending moment which accompanies it is accounted for. In the case considered it is assumed that the loads on the beam are so balanced that no restraining moment need be allowed for. If considerable moment due to unsymmetrical conditions should exist, it could be accounted for by combining it with the reversible wind moment M. Unless the loads are small, this type of joint requires stiffener bars on the beam as shown.

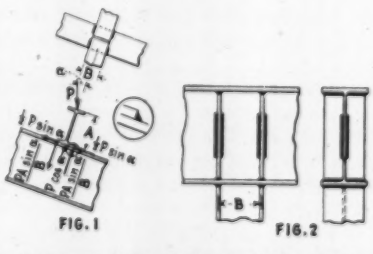


Fig. 1—Purlin resting on a sloping rafter.

Fig. 2—Beam continuous across top of a column.

At either column flange the maximum compression is $\frac{1}{2} P + \frac{M}{B}$, and the maximum uplift or tension is $-\frac{1}{2} P' + \frac{M}{B}$, the latter being ignored if negative. These simple formulas are not quite correct because they disregard the reaction between the web of the column and the bottom of the beam, but the error is not of practical importance. The top of the column is of course cut square to insure good bearing, and the stiffener bars are cut square at the bottom and butted against the bottom flange of the beam for the same purpose. The welds connecting each flange of the column to the under side of the beam do not have to resist compression but must resist any uplift or tension; they are, therefore, designed for

$$\frac{M}{B} - \frac{P'}{2},$$

stress at regular working unit stress. The combined length of such welds at each flange being L and the size D, $DL = \frac{1}{8}\left(\frac{M}{B} - \frac{P'}{2}\right)$. If this value is negative or too small to be significant, a nominal amount of welding, decided by judgment, should be used to hold the parts firmly in position.

The stiffener bars should be designed for the maximum compression that they may sustain, at not more than 18 kips per sq.in. for stress due to P alone or 24 kips per sq.in. for combined stresses. It is recommended that the thickness of the bars be not less than 1/12 the width. Each stiffener should be welded on both sides to the beam web with fillets, either continuous or intermittent, designed to transmit the maximum vertical stress, without allowance for eccentricity. The bars should also be fillet-welded to top and bottom flanges to resist the moment of the vertical forces, the bottom welds being made at least as strong as those joining the beam to the column flange. Working stresses in welds may be one-third greater than standard for resisting combined stresses in which wind and other stresses are allied.

Beam with web connection

An I-beam or channel may easily be connected by direct welding to the face of a support. This supporting face may belong to the web of a beam or to the flange or web of a column. This type of connection is effective for transmitting vertical shear, but it has very little bending resistance and should not be used alone where high moments due to wind occur or where continuity or fixation is required. Due to absence of flexible connection members, this type of connection is subject to severe secondary

stress induced by beam deflection, unless the supporting member is flexible and free to incline with the beam; more specifically, secondary bending stress requires special precaution if the supporting member is a stiff column or if another beam is supported on the opposite side. Whether the support is rigid or not, the combined throat section of the two welds should be sufficient to sustain the vertical reaction. Additional conditions should be satisfied in case the support is rigid, as will be shown. It is evidently necessary to recognize two classes of application for this type of connection—namely, that

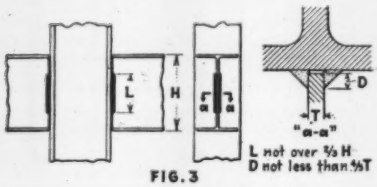


FIG. 3

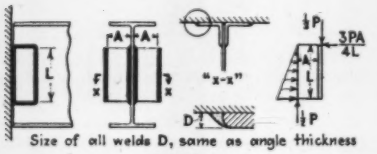


FIG. 4

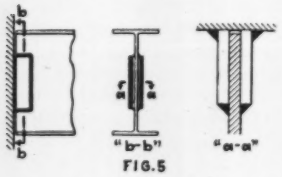


FIG. 5

Figs. 3, 4 and 5—Beam web connections to column or girder supports. Fig. 3 shows a direct connection which is effective for shear but has little bending resistance. Weld should be short and thick. Fig. 4 is a double-angle connection also unsuited to transmitting bending moment, but it may be used effectively in combination with top and bottom connections. Fig. 5, a bar connection, is less flexible than the double-angle type but more efficient than the direct-welding connection of Fig. 3.

in which there is little or no restraint or in which the connection is protected against bending stress by additional connections at the same joint, and that in which considerable secondary bending stress is induced by angular motion of the end of the beam relative to the supporting member.

Rigid and flexible connections

Fig. 3 illustrates the case in which the supporting member is in itself rigid or is restrained from deflecting to accommodate beam deflection. It is the writer's opinion that the welds in this case should be made short and thick enough to deform the beam web beyond its yield point without themselves suffering strain approaching the yield point of the weld metal, and that this requirement may be satisfied by making the weld length not more than two-thirds the beam depth and the effective weld size not less than four-fifths the web thickness. By effective weld size is meant that part of the leg width which laps the beam web, this value differing from the actual size by the amount of the gap between the beam and supporting member. It is proper to disregard a gap not exceeding $\frac{1}{16}$ in. The throat area of welds used in this way should of course be sufficient to sustain the vertical reaction.

Fig. 4 illustrates a double-angle web connection. This type has a wider range of usefulness than the direct-welding type and is less subject to troublesome indeterminate stresses. It is practically unaffected by the gap between the end of the beam and the face of the support, and it is designed without special reference to the degree of rigidity of the supporting member. It is unsuitable for transmitting considerable bending moment, being even more flexible than the familiar riveted connection which it resembles, but it may be used in combination with top-and-bottom connections designed to resist bending. The writer recommends that all the welds be made of a size equal to the thickness of the angles, that the width A of the angle leg be made at least 8 times the thickness, and that strength calculations be based on the analysis outlined in the following:

It should be realized that indeterminate bending stresses occur in web connections which are neither rigid nor perfectly flexible, and that assumptions which are not strictly correct must be made in order to analyze such connection for design purposes. Assume that the reaction between the angles and supporting member is a vertical shear P, unaccompanied by bending. This shear is transmitted by two equal vertical welds symmetrically disposed; but since the angles are not so joined together as to act as one piece, each of these two welds transmits not only a vertical shear $\frac{1}{2}P$ but also a moment in the plane of these welds due to the eccentricity of the vertical forces acting on each angle. The force system acting on one angle is shown in Fig. 4. The eccentricity moment $\frac{1}{2}PA$ is resisted by a couple composed of horizontal forces, it being assumed that horizontal compressive strain in the angle leg is so slight that a concentrated reaction is developed at the top, and that the horizontal strain in the weld varies uniformly from zero at the top to a maximum value at the bottom. The stress at the bottom of the weld, per unit of length, is then $\frac{P}{2L}$ vertically and $\frac{3PA}{2L}$ horizontally, the resultant being $\frac{P}{2L}\sqrt{1+\left(\frac{3A}{L}\right)^2}$. For standard value of unit stress in these welds the maximum allowable P is $\frac{16\,DL}{\sqrt{1+\left(\frac{3A}{L}\right)^2}}$. The welds connecting the angles to the beam web do not govern the shear capacity of this joint, because the combined unit stress due to vertical shear and eccentricity moment in the plane of the welds is somewhat lower than the stress above determined for the other welds.

Fig. 5 illustrates a double-bar connection. This type lacks the flexibility of the double-angle type and is subject to the same indeterminate secondary stresses as the direct-welding type previously discussed. It has the advantage, however, that the welds do not have to be made extra large to compensate for the gap between beam and support, and it is preferred to direct welding where the gap exceeds $\frac{1}{8}$ in. Special precautions are needed to provide against the effects of secondary bending stress in case the supporting member is rigid or restrained.

For the case of no restraint each of the four vertical welds should be designed to sustain half the total vertical reaction, the short welds at the top and bottom of the bars being adequate to resist the eccentricity moment regardless of the width of bars. Bar thickness should be the same as weld size. Bar width is nominal and may be selected to suit convenience.

For the case of a rigid or restrained supporting member the bar thickness and the size of welds should be equal and not less than four-fifths the beam web thickness, and the lengths of the bars and of the vertical welds should be equal and not greater than two-thirds the beam depth. The throat area of each vertical weld should be sufficient for one-half the total vertical reaction.

Beam resting on seat angle

The writer favors the treatment of the seat angle as a simple cantilever supporting a vertical load distributed over a portion of the outstanding leg. The stresses which this treatment disregards are of secondary origin; the only one which increases the stresses in the critical section of the angle and the weld is relieved by the angle taking a permanent set and is eliminated if the applied load is increased sufficiently to test the ultimate strength. In a seat-angle connection a slight clearance between the face of the support and the seat angle is desirable to permit the vertical leg to deflect in bending without unduly straining the welds at the heel of the angle, and may be provided by inserting sheet-metal shims at the heel and toe. The gap between the end of the beam and the heel of the angle is usually not accurately known in advance, but in practice it can readily be limited to $\frac{1}{2}$ in. as a maximum.

In a seat-angle connection the field welds connecting the beam to the seat

do not enter into the calculations but are usually needed for bracing and security and should not be overlooked in detailing. Where the seat projects beyond the beam flange it is usually most convenient to weld along the edges of the flange, but where the flange projects, overhead welding can rarely be avoided. Unless unusual horizontal stress has to be transmitted, field welds are nominal; ordinarily they are from $\frac{1}{4}$ to $\frac{3}{8}$ in. in size and from 1 to 2 in. long.

Although seat angles have a wide range of usefulness, they demand vigilance to avoid cases of inadequate bearing distance for the beams that they support. This is especially true in structures that include numerous I-beams of the thin-web, wide-flange type. For such beams it is desirable to use web connections either alone or in combination with seat angles for at least a large proportion of the deeper beams.

In Fig. 6, K represents an assumed length of bearing sufficient for safety of the beam web under the crushing and buckling actions of the force P. The two fillet welds of size D and length L at the heel are designed to prevent rotation of the angle, and the weld of size d and length l at the toe is designed to resist the vertical shear. The welds at the heel cannot help resist the vertical shear, at any value of P insufficient to cause yielding of the weld at the toe, because of the elongation of the back of the vertical angle leg due to bending.

The derivation of the design formulas, and the chain of reasoning that shows that they limit the load P to about one-half of the value that would cause simultaneous yielding of the seat angle and the beam web, will be omitted for lack of space. In order that the angle, of length B and thickness T, shall safely resist the bending at its critical section (located at distance C from the bottom of the rolled fillet),

$$3\,BT \gtrless P\left[4C\,\frac{(K+l)}{7AT} - \tfrac{1}{4}\right].$$

The welds at the heel are made not less than $\frac{1}{4}\,A$ long, and that is considered their effective length. The horizontal force restraining the angle from rotating requires a size of weld

$$D \gtrless \frac{P\,(K+l)}{7A^2}.$$

The shear P in the bottom weld requires that

$$dl \gtrless \tfrac{1}{8}\,P.$$

The length of bearing K should be sufficient to satisfy the familiar buckling formula for beam webs given in steel companies' handbooks, and also sufficient to avoid excessive crushing stress in the beam web immediately above the bottom flange fillet. The width of the outstanding angle leg does not matter, provided it is not less than $\frac{1}{2}$ in. plus the required K distance. Tables have been drawn up giving values of allowable reaction for various values of K and B.

Fixed or continuous beam connections

In case a design requires that a beam be connected to a supporting member by a rigid joint capable of developing the full bending resistance of the beam

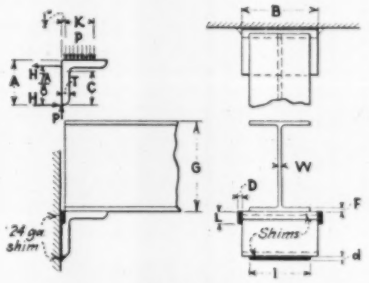


Fig. 6—Beam resting on seat angle. An important element in the design of this type of connection is to provide sufficient length of bearing to guard against buckling of the beam web.

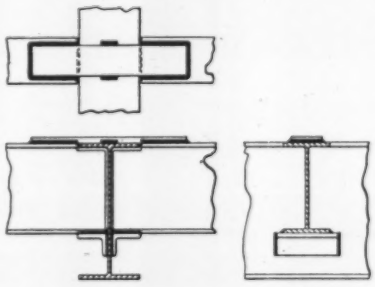


Fig. 7—Continuous connection for floor beams framing into a girder. Top-flange tension transmitted by bar over top of girder. Thrust is carried by horizontal weld at bottom, while vertical weld on seat angle takes the shear.

or a high proportion thereof, it is generally necessary to connect both top and bottom flanges of the beam to the support, unless a kneebrace or triangular gusset be used in combination with an ordinary web or seat connection. A fixed connection having bending resistance equal to that of the beam itself is suitable for use in a line of continuous beams or for resisting severe bending stresses caused by wind.

Neither continuous beam theory nor the determination of bending moments and shears caused by wind need be treated here. It is sufficient to deal with the designing or the arc-welded joints.

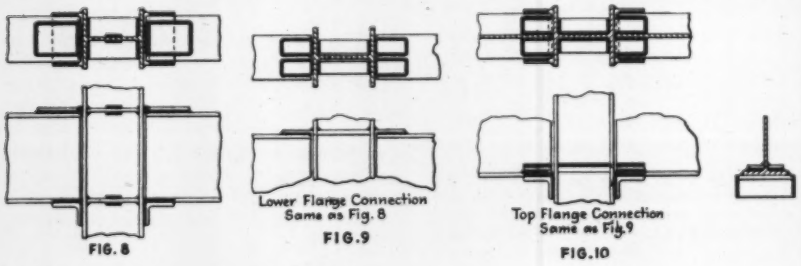
Fig. 7 shows a continuous connection for a pair of floor beams supported by a girder. Generally speaking, no wind stress need be considered at such a joint, the duty of which is to resist the end shears of the two beams and the negative bending moment due to continuity. The seat angles should be made adequate for the vertical shears. The bending moment should be divided by the beam depth to determine the top tension and the bottom thrust. The cross-sectional area of the tension bar at the top should be sufficient for the calculated tension, and its length should be enough to provide adequate length of fillet welds of suitable size for transmitting the tension from the bar to each of the top flanges. Welding across the end of the bar as well as along the edges can be counted as effective. The width of the bar should be enough less than the width of the beam flange to leave ample room along both edges for welding. Using heavy welds economizes in bar weight, but above $\frac{3}{8}$-in. size the total cost of welding increases.

The thrust at the bottom flanges can usually be resisted most economically by butt-welding the bottom flanges to the girder web; for this purpose it is not necessary to bevel the ends of the flanges or even to provide for a gap of definite width, because every strength requirement is served by filling the crack with metal regardless of thorough fusion. However, in case the beam flange itself is slightly deficient in section to withstand the thrust, such deficiency may be made up by continuing the butt-welding part way up the web. Another way to develop the bottom thrust is to weld both edges of the flange to the seat angle all along the distance of contact, but for large beams this is usually insufficient because of limited length of the angle leg. Such deficiency is sometimes made up by placing narrow bars of sufficient thickness on top of the beam flange, butting them squarely against the girder web and welding the long edges to the flange. In case the two beams are unequal in depth, there may be danger of shearing through the girder web horizontally. In such a case, thrust bars may be butted against the girder web directly opposite the bottom flange of the shallow beam and welded to the web of the deep beam, the entire bottom thrust being transferred by these bars.

There are several variations of the joint shown in Fig. 7. The beams may be connected to the web of a column instead of a girder, the only difference being that the tension bar passes through a slot in the column web. In this case a nominal amount of fillet-welding is used on one or both sides of the web to connect it to the bar for stiffening purposes, or else a considerable amount of heavy welding is used in the same places if required to resist wind stresses. In the case of a beam supported by a girder and not flush with the top flange, the tension bar may pass through a slot in the web of the girder much as it does through the web of a column. No satisfactory method has been devised for developing continuity in cases where the beams are lower than the girder by an amount insufficient to allow a tension bar to pass through the girder web. Where the bottoms of the beams are only slightly above the bot-

tom of the girder, bars resting on or blocked up from the girder flange may be used to transmit bottom thrust. However, to avoid transferring the vertical beam reaction directly to the girder flange, it is necessary to provide some sort of web connection to take care of the vertical shear. This variation, combined with the case where the tension bar passes through a slot in the girder web, was used for the stringers of the Chicopee Falls railway bridge.

Fig. 8 shows a type of joint which has proved effective though not very

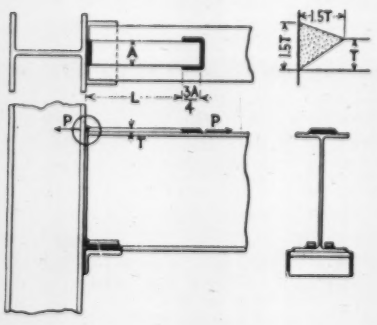


Figs. 8, 9 and 10—Beams continuous through a supporting column. In Fig. 8 the top-flange tension is transmitted by bars butt-welded to the column flange. In Fig. 9 the top-flange tension bars pass through slots in the column flanges. Fig. 10 illustrates beam continuity through a column where wind causes bottom horizontal stress to be alternately compression and tension. Bottom-tension bars pass through column flanges.

economical for developing continuity of beams connected to column flanges. The top flange tension is transmitted to the column flange by means of a bar, fillet-welded to the beam flange and butt-welded to the column flange. The butt-welding should be done before the bar is welded to the beam, to minimize residual stress in the butt-weld. The horizontal bars between column flanges opposite the top flanges of the beams and the welds joining them to column flanges are designed to transmit as much of the beam-flange tension as cannot safely be transmitted by the column alone. The bars opposite the bottom flanges of the beams are designed to assist the column in transmitting the horizontal thrust. A variation of this type of connection (Fig. 9) may be made by extending the top tension bars through slots in the column flanges. This has been used in practice with cantilever beams and found more economical than the other type.

In case that bending due to wind is much more severe than bending due to floor loads, a modification of the type shown in Fig. 9 may be advantageous. Fig. 10 illustrates this. The principal variation is that the bottom horizontal stress, which is alternately compression and tension, is transmitted by bars that pass through the column flanges and are welded to the bottom flanges of the beams and to the web of the column.

Fig. 11—Semi-rigid connection for resisting wind bending. Top bar is made comparatively long to compensate for the movement of the beam away from the column under load.



Semi-rigid connections

Connections of lower cost than the fixed types are needed to resist wind moments that are insufficient to justify the use of joints as strong as the beams. For example, Fig. 11 shows a joint adapted to resisting wind bending without causing fixation or continuity. It differs from a fixed connection of similar composition mainly in that the top bar has a free length L sufficient to sustain safely a permanent elongation or set equal to the maximum movement of beam flange away from the column. The vertical reaction is carried by a seat angle. Horizontal compression due to negative bending moments might be taken care of by using additional welding to join the beam flange to the seat angle, except that the seat angle is not suitably connected to the column to resist much horizontal tension in the outstanding leg. Therefore, two small bars are placed on top of the bottom flange of the beam and welded to the column and the beam flange.

Splices for girders and columns

In Fig. 12 is shown a splice for a rolled girder. Assuming it is designed for bending moment M and shear S, the cross-section of the top bars and bottom bars should each be sufficient for tension or compression equal to M divided by the depth of the beam; and the fillet-welds connecting these bars to the beam flanges should be made sufficient in size and length to transmit the same stress. A single bar could be used instead of two bars on the top flange, but it would have to be twice as long or else be attached by welds of double the size. For large beams the use of a single top bar is uneconomical due to excessive bar weight or volume of welding or both. The web splice is designed for shear S, the weld size and length being calculated, and the splice-plate thickness should be the same as the weld size. Only the vertical welds resist the shear S, the horizontal welds being assumed to act only in resisting the moment of the couple formed by the vertical weld stresses. The width of the splice plates should be at least six times their thickness to avoid abrupt changes in direction of stress.

Typical column splices are illustrated in Fig. 13. Erection bolts are not shown in all the figures, but they are usually wanted.

Kneebraces

In bridges and in buildings, angle kneebraces are of fairly common occurrence. Fig. 14 shows a single-angle brace without connection angles and a double-angle brace with connection angles. Of course the single-angle braces may be used with connection angles, and double-angle braces may be used without them. Connection angles permit the use of clamps or erection bolts and facilitate erection. They also

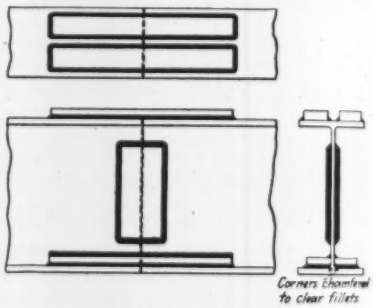
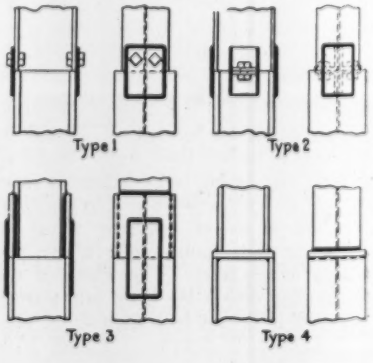


Fig. 12 — Splice connection for a rolled girder. Double top bars are necessary for heavy girders in order to secure a sufficient amount of welding and still keep bar lengths and weld sizes within reasonable limits.

Fig. 13—Column splices may be of various types and are among the simplest of welded joints.



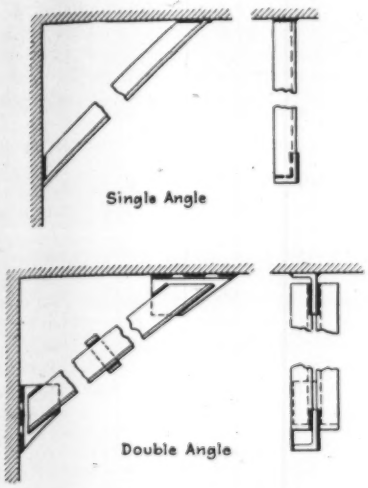


Fig. 14—Kneebraces may be of single-angle or double-angle types. Connection angles may be used with either.

save the necessity for cutting the kneebrace angles accurately, and they increase safety in bridge floors and other framing subject to shock, in that they eliminate residual temperature stress parallel to the axis of the kneebrace, which occurs when the ends of the brace are welded directly to the main members.

Double-angle truss member

Fig. 15 shows a pair of angles forming a truss member connected to another member without a gusset plate. The two angles are supposed to be connected to each other at one or more intermediate points along their length, so that their outstanding legs may take a fair share of the tension or compression without severe bending stress occurring in the end-connection welds, and so that the angles shall act as a unit in case they form a compression member.

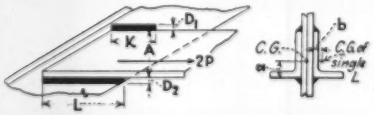


Fig. 15—Double-angle truss member direct-connected, without a gusset, to another truss member.

Let the total stress in the two angles be $2P$, and assume that the resultant reaction of the two welds at each angle is a force P in the plane of those welds opposite the centroid of the angle. The welds then resist longitudinal stresses amounting to Pa/A and $P(A-a)/A$ respectively. If the weld sizes are D_1 and D_2, and the lengths are K and L, the conditions necessary for standard stress are: $D_1K = Pa/8A$ and $D_2L = P(A-a)/8A$.

Strictly, since the outstanding legs are not provided with clip-angle connections, an allowance should be made for bending stress in the welds due to the single-leg attachment. In line with the usual practice of neglecting *minor* eccentricities, the author recommends that this bending be ignored unless it increases the maximum unit weld stress more than 25 per cent. Under this rule it can be shown that the bending may be disregarded if D_2 is not more than twice the angle thickness and if the outstanding angle legs are not wider than the other legs.

Heavy gusseted truss joints

Fig. 16 shows details of a joint in a heavy truss made of H-columns. The chord is not spliced at the joint; therefore the horizontal stress shown on the figure is only the chord increment. Members are connected to the two gusset plates by fillet-welds and slot-welds. Fillets of moderate size require less weld metal per unit of strength than slot welds and are therefore used at all readily accessible edges, the remainder of the required resistance being made up by slot-welds. The gussets might be made larger, as for riveted joints, thus providing more space for fillet-welds, but the increase in weight of gussets more than offsets the advantage. The slot-welds are placed parallel with the axes of the members and are located so as to put the center of resistance of all the welds for each member on the axis of the member. For example, the compression diagonal member has to transfer 287 kips from each flange. The five ½-in. fillets, aggregating 45½ in. of weld metal, have combined resistance of 45½x4 = 182 kips, and their center of gravity is to left of the axis, the moment of resistance with respect to the axis being 184,000 in.-lb. A slot-weld is to be provided, having resistance 287-182 = 105 kips, and located 184 ÷ 105 = 1¾ in. to the right of the axis. A slot-weld 1x½ in. is selected, having a safe resistance of 11.3 kips per inch, and is made 10 in. long. Note that building-code stresses are used in this illustration; a similar joint in a railway bridge truss would have more welding.

In this example the length and thickness of gussets have been made 30 in. and ⅞ in., respectively, causing the critical horizontal section just above the chord member to have 18 kips per sq.in. bending stress and 12 kips per sq.in. mean shear. The height has been made 28 in., making the mean shear in the central vertical section 12 kips per sq.in. Greater thickness would permit a slight saving in gusset weight but would rapidly increase weld volume, while less thickness would rapidly increase gusset weight with small advantage in welding. Each joint needs to be studied as a special problem, and some trials are generally necessary to determine suitable gusset dimensions.

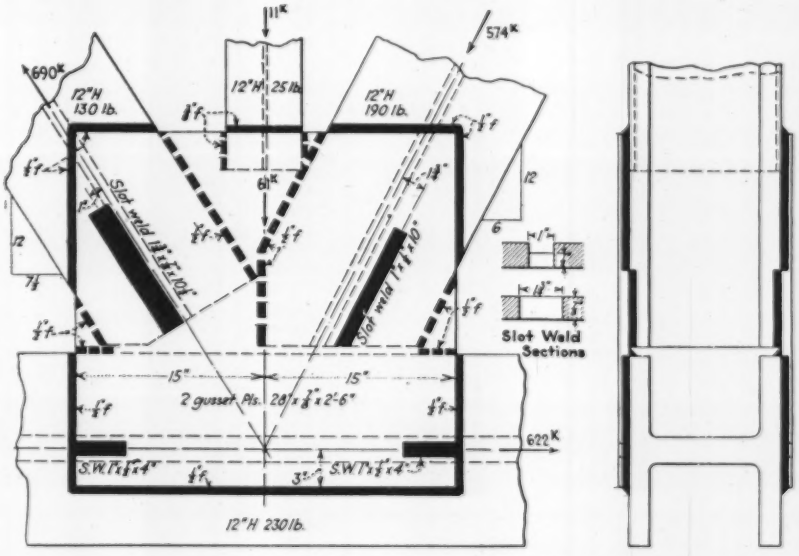


Fig. 16—Welded joint in a heavy truss in which fillet-welding is supplemented by slot welds to secure sufficient weld section.

Sometimes slot-welds are used in parallel pairs to concentrate the stresses and reduce the required length of lap on the members, but this is restricted by the tensile stress in the tongue of the gusset plate between the slots.

Study of the volume of weld metal in this illustrative case shows that no economy would result from using ¾-in. fillets instead of the ½-in. size, except for the diagonal tension member, where a more economical slot-weld section could then be used. It would not be wise to vary the fillet-weld size in the case of a single member, because inconvenience and error would be likely to result from such variety.

Fast-Truck Concrete Haul Cuts Building Cost

Group of scattered buildings served from central mixing plant by two small trucks with bottom-dump bodies—Wood pans or cores reduce floor costs

By Wm. Joshua Barney

President, Barney-Ahlers Construction Corp., New York, N. Y.

THE construction of the Meadowbrook Hospital in Nassau County, New York, required the erection of reinforced-concrete frames and floors for five separate units, about 900 ft. apart in one direction and about 700 ft. apart in the other. The larger of these units was in fact two buildings in one, five stories in height with a basement. These various buildings were connected by service tunnels of reinforced concrete. The relative dimensions and locations are shown on the accompanying sketch plan.

There was thus presented the problem of pouring 8,500 cu.yd. of concrete over a wide area. In the original estimate for this work it was planned to provide a separate plant installation for each unit consisting of a hoist tower and bucket, mixer, etc. Some discussion was had of the use of a central mixing plant, but it was felt that the employment of the usual revolving-type agitator truck would be too expensive for the volume of concrete involved.

After the contract had been secured, the plant installation came for review before Mr. Ahlers, executive officer of the company. In view of the local labor requirements, necessitating the employment of a hoisting engineer for each separate plant, and the cost of installing five separate plants, Mr. Ahlers set about finding a practicable way of installing a central plant and distributing the concrete therefrom to the various units as they were constructed. A central plant of proper capacity would make cheaper production and also permit a more rigid and economical control of proportioning.

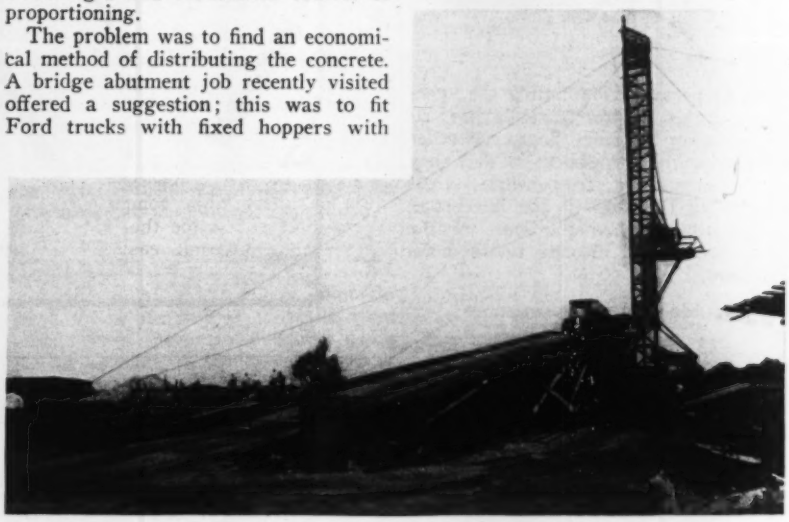
The problem was to find an economical method of distributing the concrete. A bridge abutment job recently visited offered a suggestion; this was to fit Ford trucks with fixed hoppers with bottom gates. To set at rest the question of segregation or setting during the haul, one of these trucks was secured, a concrete plant was set up in the company's yard, concrete of the proportions required was mixed, and the truck was loaded and sent out for a run corresponding to the longest run at Meadowbrook. The concrete was then dumped into a temporary form and samples were taken; this procedure was repeated several times to make sure of fair tests. Test cylinders were broken, and it was found that the concrete was entirely satisfactory and in no wise separated or sufficiently set to affect its quality, workability or appearance. The time required to load these trucks and transport them a given distance, to dump them and return was also determined by experimentation.

From these data the proper size of mixer to place in the central plant was determined, as well as the number of trucks required. The progress on the various units was carefully planned so that while concrete was being poured on one unit, forms could be erected on another and steel placed for another, so that with comparatively small gangs of carpenters, laborers and metal lathers located through the various buildings, a high degree of efficiency could be expected in form erection and stripping and in placing steel and concrete. Emphasis was placed on executive and job control of progress and rotation of operations.

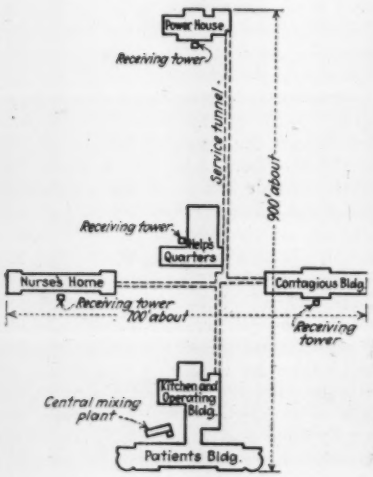
A complete gasoline-driven central plant, based on a 1-yd. mixer, was installed between the Patients' Building and the Operating Building, which form the largest unit of the five. This location permitted placing concrete in these buildings directly into floor hoppers from a hoisting tower alongside the main plant. As shown by the illustration, aggregates were delivered by trucks up a ramp for gravity handling through bins to the concrete mixer below. The hoisting tower of the central plant carried a chute with a receiving hopper, from which the concrete was dumped directly into two trucks with 1-cu.yd. hoppers.

Immediately upon being loaded these trucks departed at high speed to the hoist towers (one at each unit), where they backed up and dumped the concrete into a 1-cu.yd. hoist bucket by which it was taken to the floor being concreted. It was found that two trucks could handle the output of the central plant and supply the separate units with concrete rapidly enough to insure steady and satisfactory progress of each unit. The drivers of these trucks acquired unusual efficiency in performing their deliveries, and during the several months that this method of delivering concrete was in progress no unsatisfactory breakdown or delay occurred. It was the

Ramp to bins over mixer enables direct discharge of materials trucks; hoist tower delivers concrete to floors of main building and has side chute for loading trucks.



Sketch plan of Meadowbrook Hospital, showing scattered units served with concrete from central plant by two light hopper-body trucks.



consensus of opinion that the distribution of concrete was as satisfactory as though each separate unit had had its own mixing plant. The deliveries by the two trucks averaged about 120 cu.yd. per day, with a maximum of 170 cu.yd., which fully met the requirements of job progress.

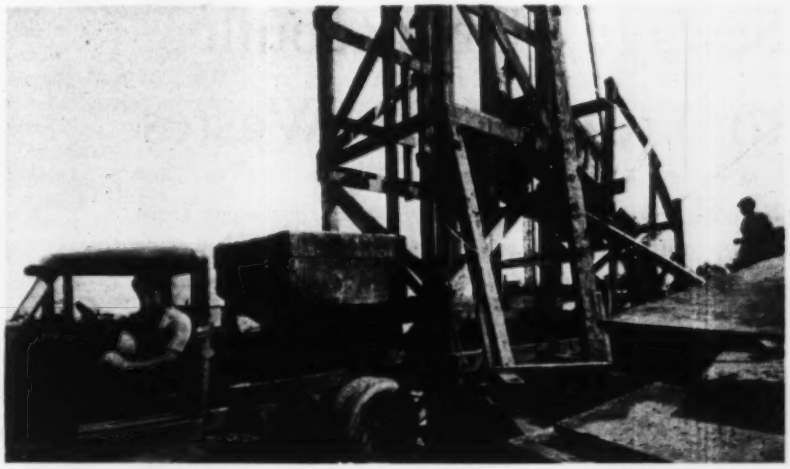
It is estimated that on the 8,500 cu.yd. of concrete, about 25c. a yard was saved in the plant installation and mixing and pouring of concrete by the use of this central mixing plant instead of separate plants at each building.

The specifications required that numerous cylinders should be made out of each pouring of concrete taken from the floor. To meet these requirements, a very complete testing laboratory, with a machine for breaking cylinders, was erected on the work immediately next to the central plant and was placed in charge of a thoroughly competent and experienced engineer for proportioning and testing concrete. Cylinders were taken frequently from each floor as poured, properly cured, stored on the job and broken under the supervision of a representative of the county hospital board. None of these cylinders broke under the required strength, the larger number gave a materially higher strength than was required by the specifications, showing that the concrete transported and handled in this manner arrived at its final destination in an entirely satisfactory condition.

In carrying out this program very careful control had to be maintained of every step in the progress of the work, speed schedules being made out in detail and checked daily in the field office.

Wood-core floor forms

As a further aid to the smooth progress of this work, the floor construction was especially of interest and value. As specified, the usual procedure would have been to use tin pans or metal forms, but after careful consideration, based somewhat on the experience of the Turner Construction Co. in their hospital at Brentwood near by, it was decided to use wood cores.



Trucks from central plant dump to buckets of hoists that distribute concrete to floors of smaller buildings.

As the use of these wood cores or boxes was unusual in the metropolitan district, a number of experimental types were made up in the company's yard, especially to determine the best angles and slopes to permit easy stripping. Furthermore, two engineers were especially assigned to make detailed drawings of the proper place for all cores in each floor. These cores were then numbered, and it became possible for the carpenter foreman, with the assistance of a field engineer, to move certain types and sizes of cores promptly and accurately from one location to another, these cores being designed of size and shape to permit their re-use throughout practically the entire five units except for the power house, where special beam-and-girder and other forms were required.

It was found that the first cost of these cores was more than anticipated, certainly more than the first cost of renting tin pans. On the other hand, they gave a far superior working condition in the field, as their rigidity permitted the more rapid placing of the cores themselves and also permitted the placing of steel at less cost and effort due to the firm and rigid working surface on which the metal lathers worked. Further, the tightness of these wood forms prevented the considerable loss of cement mortar usually experienced in the metal-pan system. Again, the rigidity of the wood cores obviated deflection, thus avoiding the excess thickness of concrete in the floors so frequently found in the more yielding metal pans.

One of the most marked advantages in using these wooden cores was that when stripped they left good concrete surfaces that were readily finished into unusually fine ceilings.

One of the sections of the buildings required the use of deeper cores, and these were made with a removable strip around the bottom so that when they had been used first in the deeper location, the bottom strip could be removed and shallower cores left for the rest of the work. It was found at first that these bottom strips had a tendency to spring slightly, giving some difficulty in the stripping of the first few units, but further bracing promptly removed this objection. Aside from this, no difficulty was experienced in removing these cores, as a wire hook was placed inside of each and a special cant hook made that permitted the core to be withdrawn quickly and easily by placing the cant hook in the wire with a lever against the adjoining rib.

While it is difficult to determine precisely the relative costs of these wood cores and of metal pans, a conservative summary of the comparative costs indicated a saving of about 2½c. per square foot of pan area.

The architects for this work were the office of John Russell Pope and the general contractor was Chas. T. Wills, Inc. The reinforced-concrete frames and floors covered by this article were placed by the Barney-Ahlers Construction Corp.

Wood-core floor forms produced excellent ceiling finish and provided an exceptionally solid working platform for men placing steel and concrete.

Sewage Plant Rebuilt to Treat Rayon Wastes

In new activated-sludge plant grease-bearing waste from textile mill must be closely controlled—Casein wastes from creamery must be eliminated from sewage entirely

By U. F. Turpin
With Consoer, Older and Quinlan, Consulting Engineers, Chicago, Ill.

WHEN business in the coal town of Sparta, Ill., 60 miles southeast of St. Louis, became inactive in 1923 due to labor troubles, its business men brought to the town a creamery and a textile mill to provide employment and increase the sale of water. Little thought was given at the time to the difficulties and costs of disposing of the liquid wastes of the new industries. It was soon found that the wastes from the creamery and the rayon mill made impossible any bacterial action in the already overloaded Imhoff tank and contact filters then treating the town's sewage, so that a practically untreated effluent was discharged into the small stream. By 1930 complaints, threatened suits and urgings by the state board of health became so insistent that a thorough study of the situation become imperative. As a result of the studies, the existing sewage plant was remodeled to operate on the activated-sludge principle, with separate sludge digestion. Experiments made indicated that this method of treatment would handle the rayon wastes and domestic sewage if the proportion of the former were limited. The creamery wastes had to be eliminated entirely from the sewage flowing to the plant.

The creamery is owned and operated by the St. Louis Dairy Co. Milk is received from farmers in the surrounding rural territory. The cream is separated from it and shipped to St. Louis, and the separated milk is used in the manufacture of casein. The process involves the forced coagulation of the milk by the addition of sulphuric acid and the separation of the resultant whey by draining and pressing. All of the whey, together with several washings of the casein, was discharged into the sewer until it was found that the whey contained some food value when mixed with bran or small grain and fed to hogs. A small elevated tank was then installed, and as much of the whey as could be taken by the farmers was disposed of in this manner. About 7,000 gal. of city water is used daily, producing 3,000 to 4,000 gal. of whey and casein washings.

The textile mill is operated by the Weil Kalter Manufacturing Co., manufacturers of undergarments. The garments are made exclusively of rayon, which is purchased in cones saturated with a light mineral oil ready for spinning. The work performed at the mill includes spinning the yarn into cloth, washing, dyeing, bleaching and drying. The cutting, sewing and the actual manufacture of garments is mostly done elsewhere. The plant has been in operation since 1927. The yearly production of this mill, in pounds of rayon used, has varied from 356,000 in 1928 to 967,700 in 1931. The amount of soap used yearly has varied from 14,000 lb. in 1928 to 21,000 lb. in 1931. The amount of soda ash used was 10,000 lb. in 1928 and 21,000 lb. in 1932. The amount of mineral oil removed from the cloth by washing varies from 200 to 450 lb. per day. From 300 to 800 lb. of analine dyes are used yearly. Water is purchased from the city and varies in amount from 20,000 to 65,000 gal. per day. This industry employs 125 people when operating at capacity.

The total average dry-weather sewage flow, exclusive of rayon waste, amounts to 110,000 gal. per day. The rayon waste varies from 20,000 to 65,000 gal. per day. During long periods of rain, infiltration and roof drainage increase the total flow to 800,000 gal. per day.

Preliminary studies

Unable to find any record in the technical press of the treatment of rayon waste, an experimental plant financed by public subscription was operated for three months. A detailed account of the experimental work will not be given here, other than to say that many forms of chemical and bacteriological treatment were tried. The waste from the mill may be roughly divided into two classifications: spent dye liquors and rinse waters, and boil-off. The spent dye liquor and rinse water compose about three-quarters of the mill waste and contain a small amount of soap. A mixture of 60 per cent of this liquid and 40 per cent of sewage responded well to all bacteriological treatment. The boil-off contains a large amount of soap, washing powder, detergents and all of the oil that was previously in the silk yarn. It has the appearance of rich milk, all of the oils and greases being in emulsion.

The washing and dyeing processes are done by the batch method, making possible the separation of the boil-off from the other wastes. A chemical treatment, using ferrous sulphate and lime, proved to be the only satisfactory means of treatment for the boil-off. To produce a clear liquid, 30 grains per gallon of ferrous sulphate and 36 grains per gallon of lime were necessary. The sludge was dark green in color and could be dried successfully on sand beds without odor. On account of the large amount of chemicals necessary for the treatment of the boil-off and the consequent expense, it was thought advisable to determine the maximum amount of boil-off that could be treated in combination with the rinse waters and city sewage. The activated-sludge process was found to be best adapted to treatment of this combination, and it was found that if the discharge of the boil-off did not exceed 6 per cent of the total sewage flow good purification of the whole could be accomplished. This corresponds to a grease content of about 150 p.p.m. With more than this amount the activated sludge became coated with grease, no amount of air could keep it

Sewage-treatment plant, Sparta, Ill., handles heavy dosage of rayon wastes.

from becoming septic and the process broke down completely.

On the basis of information determined in the experimental work the construction of an activated-sludge plant with facilities for chemical treatment of boil-off, if such became necessary, was recommended.

New plant

The existing plant comprised an Imhoff tank, a sludge bed, dosing chamber and contact filters. As the concrete in the Imhoff tank and dosing chamber was in fair condition, it was decided to use these units in the new layout. The Imhoff tank was made into two separate sludge digesters by removing the interior baffles and adding floating covers. The adjacent dosing chamber was cleaned, given a coat of plaster and converted into a basement for the control house. In this basement were placed the air compressors, sludge pump, gas boiler, drainage well with centrifugal pump, meters and all necessary mechanical features of the plant. The control house built above contains an office, laboratory, chemical storage room and chemical treatment tanks.

The flow is measured at a point between the screen chamber and the primary tank by an 8x12-in. cast-iron flume meter of egg-shape section, 26 ft. long. The recorder is equipped with recording, integrating and totalizing mechanisms.

Primary Settling Tanks—Two primary settling tanks provide a detention period of two hours at the average flow of 140,000 gal. per day, and 20 min. at the maximum flow of 800,000 gal. per day. They have adjustable weir plates at both inlet and outlet and a sludge draw-off in the bottom of the hoppers. Sludge can be removed by gravity to a central drainage well and pumped to the digester by a centrifugal pump, or it can be pumped to the digester by a plunger pump that has direct suction to the hoppers.

The primary-tank outlet channel is equipped with an orifice plate so that all flow over 400,000 gal. per day is bypassed to the creek after primary sedimentation.

All sewage is given secondary treatment. After primary settling it is mixed with return sludge and sent to either of two aeration tanks.

Aeration Tanks—Two aeration tanks of the diffused-air type are each 10 ft. deep, 12 ft. wide and 53 ft. long. Each tank provides a detention period of six hours at the average flow of 140,000 gal. per day, and both tanks provide four hours' detention at a maximum flow of 400,000 gal. per day, allowing 25 per cent in each case for return sludge. These tanks can be operated independently, in parallel or in series. Adjustable weir plates are placed at both inlets and outlets.

Secondary Settling Tanks—Two plain hopper-bottom secondary settling tanks, with a capacity of 10,000 gal. each, provide 3.4 hours' detention at the average flow of 140,000 gal. per day and 1.2 hours' detention at the maximum flow of 400,000 gal. per day. These tanks can also be operated independently, in parallel or in series.

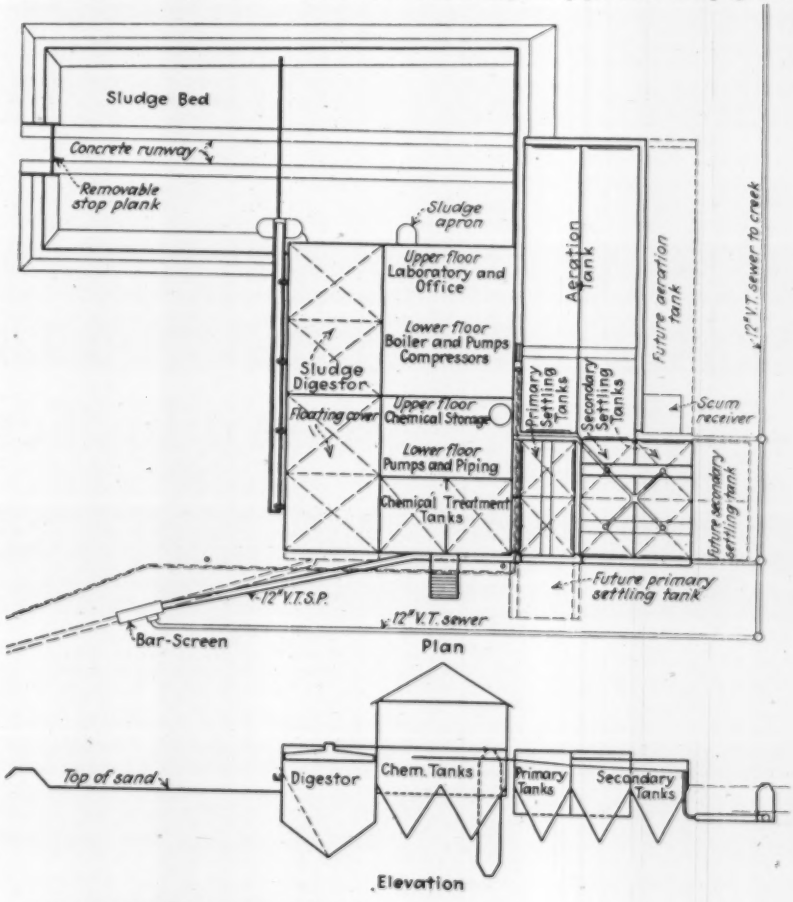
Sludge-Diversion Box — Activated sludge is lifted from the bottom of the secondary tanks by air lift to a diversion box, from which a part is returned to the process through the orifice-plate meter. Excess sludge can be returned to either digester or primary tanks by gravity.

Chemical Treatment Tank—The total capacity of the chemical tanks is 19,000 gal. This is sufficient to hold two to three day's production of boil-off liquors. Agitation in the tank is accomplished by a perforated pipe and compressed air. Chemicals are fed dry to the rotating liquid.

Sludge Digestion Tanks — The old Imhoff tank was remodeled into two digesters having a total capacity of 8,100 cu.ft. The tank is equipped with floating covers and heating coils. Sludge can be drawn by gravity or pumped to beds with a plunger pump.

Sludge Drying Beds—The existing sludge bed was abandoned. Stone was removed from one old contact bed and replaced with a 6-in. layer of sand to form a new sludge bed. Concrete driveways provide means of removing sludge with wagons or trucks.

Scum Bed — Each primary settling tank is equipped with a vertical pipe skimmer for the removal of grease and scum. Grease is conveyed to the scum bed through a pipe on a steep grade. Skimmings after draining can be burned or buried.



Sparta activated-sludge sewage works utilized old Imhoff tanks and contact beds.

At the rayon mill a concrete reservoir was constructed with two compartments, one for the storage of boil-off and the other to hold all other wastes from the mill. Through regulating float valves the wastes are fed to the sewer in proportion to the sewage flow. The reservoir performs two functions, storage to permit the dosing of the mill wastes over a 24-hour period and neutralization of color. Each batch as it is dumped into the reservoir may be a different color, as all colors are used in the dyeing processes. The effect of mixing the batches together results in a light brown color, which after treatment through the activated-sludge plant is scarcely noticeable. The boil-off compartment is directly connected with the sewer by a 10-in. pipe, so that the entire compartment may be

emptied in a short period of time and conveyed through the sewer to the chemical treatment tanks at the plant. This can be done at periods of low flow in the sewers, such as early in the morning or late at night with very little dilution.

Operation results

Operation of this sewage plant was started early in 1932. Considerable difficulty was experienced in developing and maintaining a satisfactory activated sludge. After three or four months of operation the trouble was traced to the casein room at the dairy. Precaution had been taken at the outset to exclude from the sewage flow all of the whey from this process with the exception of press drippings and floor washings. This amount was so small as to appear negligible. In the latter part of May, with the cooperation of the dairy, all floor drains in the casein room were disconnected from the sewer and connected to the sump from which the waste is pumped to the tower and tanks for distribution to farmers. After this change was made, no further trouble was experienced in maintaining a good activated sludge. From this experience it would seem impossible to treat sewage containing as little as 1 per cent of casein waste and maintain a satisfactory activated sludge at all times in this plant.

On June 2 the waste from the rayon mill was turned into the plant, being admitted to the outfall sewer in proportion to the flow in the sewer. All wastes from the mill, including the boil-off, were mixed in the reservoir and dosed together. No trouble was experienced except that more air was required.

On June 13 a 24-hour composite was taken of the raw sewage and final effluent, with the following results:

	Raw Sewage, P.P.M.	Final Effluent, P.P.M.
Total solids	1,870	1,266
Volatile solids	564	252
Total suspended solids	534	5
Volatile suspended solids	440	4
Chlorides	283	184
Alkalinity	440	455
B.O.D.	405	5
Grease	151	—

Monthly reports for the months of June and July are available from which the following data are taken:

	June	July
Raw sewage received, average gal. per day	134,900	140,500
Aeration period — average in hours	6.6	12.5
Air per gallon of sewage, average cu.ft.	2.2	1.66
Rayon mill waste received, average gal. per day	No record	42,500

During the month of June only one aeration tank was used, providing an aeration period of about six hours. In July both aeration tanks were put in service, increasing the aeration period to 12.5 hours and reducing the air required per gallon by 0.54 cu.ft. Inasmuch as there is a saving in utilizing both aeration tanks, providing the longer aeration period, this practice will be continued.

Conclusions

1. A rayon-mill waste when mixed with city sewage may be treated successfully by the activated-sludge process, the amount of oil and grease being the governing factor. It would seem from this experience that 150 to 160 p.p.m. of grease is the maximum that can be treated successfully. When grease exceeds this amount it will be necessary to treat chemically a portion of the boil-off waste.

2. Relatively small amounts of casein waste make it impossible to maintain an activated sludge.

3. The B.O.D. of the boil-off waste can be reduced approximately 95 per cent by chemical treatment with ferrous sulphate and lime. The B.O.D. of the boil-off is about 2,000 p.p.m.

4. On plants of this type and size the cost of adequate engineering service for an experimental plant and the completed plant will easily amount to 12 to 18 per cent of the construction cost. The total cost was $50,000.

The plant was designed in the offices of Consoer, Older & Quinlan, Chicago, Ill., with the help and advice of T. Chalkley Hatton, consulting engineer, Milwaukee, Wis. Acknowledgment is due the chief chemist of the laboratory of the state board of health of Illinois for the chemical data used in this article and to the engineering staff of the sanitary water board, headed by Harry F. Ferguson, for the helpful suggestions offered during the experimental work.

Soil Action Under Load Shown by Test

Movement of soil under test load disclosed by excavating vertical cut under loaded area and by observing soil movement and moisture condition, with analysis of determinations

By Dimitri P. Krynine
Research Associate in Soil Mechanics, Yale University, New Haven, Conn.

IF A BUILDING 100x100 ft. settles 3 in., this means that 100x100x¼ = 2,500 cu.ft. of earth disappear from the job. Before answering the question as to where that earth has gone, let us describe a load experiment made last summer in Connecticut.

Load experiment

This test consisted in loading the ground surface previously cleaned from vegetation. A load of 12 tons was applied to a surface of 4 sq.ft. (1x4 ft.). The duration of the test was three weeks, after which the experimental platform was unloaded and an excavation more than 3 ft. deep was made. Fig. 1 is a photograph of a cross-section as seen in the excavation.

The loaded soil was fine silty sand, of the so-called Podunk silt-loam group. It may be characterized as a non-consolidated alluvial deposit, containing 82.5 per cent of fine sand under 0.3 mm., 15.5 per cent of both silt and clay, and about 2 per cent of colloids under 0.002 mm. A highly compressed zone was found underneath the loaded platform having a cross-section similar to a circular segment, perhaps somewhat greater than a semicircle. This zone was evidently lighter in color than the rest of the soil. Moisture content was determined; and it may be seen from Fig. 2 that the moisture content throughout the soil mass was from 32.2 to 39.1 per cent by dry weight, while in the highly compressed zone the moisture content was only 18.4 per cent as measured 2 in. below the top. Since the plastic limit of the soil in question is about 30, this means that the semicircular zone under the platform lost its plastic properties during the process of settlement.

The phenomenon of settlement happened therefore in the following manner: the loaded platform together with a non-plastic semicircular body underneath made its way through the plastic medium of the rest of the soil. Three white dotted lines may be seen in Fig. 1. These are paper slips fixed by pins to the vertical earth wall of the excavation. Two upper lines correspond to thin natural layers of a somewhat coarser sand included in the silty sand deposit. The lower curve corresponds to the natural boundary line between a relatively red and a relatively blue soil; and after the excavation was made, it was clearly seen how one of these soils was pressed into another along a smooth surface. All the curves shown in Fig. 1 are bent owing to the influence of the load, and this influence decreases with the depth. However, the influence of the load in a horizontal direction increases with the depth. There was also a thin sandy layer close to the bottom of the

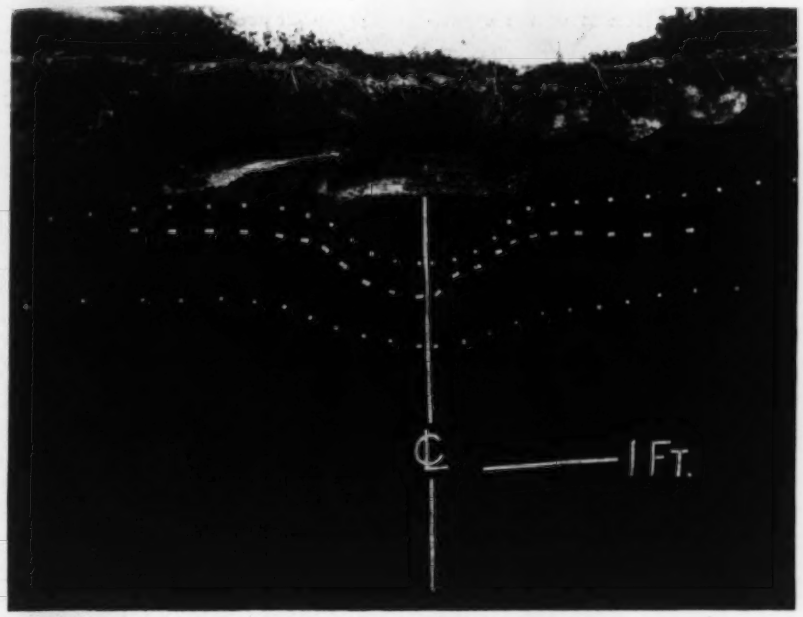


Fig. 1—Photograph of excavation, showing the state of soil immediately after load test at East Hartford, Conn. White marks show bent strata.

excavation, unfortunately very irregular; but as far as it was possible to judge, the load did not exert any appreciable influence on it. The ground-water was slightly below the bottom of the excavation. Borings disclosed clay at about 19 ft. and rock (resistance) at 128 ft. below the ground surface. Practically no bulging (upheaval) took place in this experiment. The behavior was observed of 26 stakes, 6 and 12 in. long, driven at variable distances up to 4 ft. from the loading platform. All the stakes went down with the exception of one that moved slightly upward (about 0.003 ft.)

A scale in the form of a 1-ft.-long paper strip in Fig. 1 permits measuring distances on the photograph.

Soil pressed out

The material pressed out by the loaded platform (Figs. 1 and 2) must have remained practically within the highly compressed semicircular zone. This simply follows from the fact that all the earth that was above the upper sand layer before the deformation remained above it after deformation (Fig. 1). This constitutes the answer to the question formulated in the beginning of this article so far as soils similar to that described are concerned.

As to the shape of the highly compressed zone under a building, the East Hartford experiment itself furnishes an indication that this zone may or may not be semicircular. Since the highly compressed zone under the load platform was semicircular in the shorter cross-section (1 ft. wide), obviously it could not be so in the longer cross-section (4 ft. long). Possibly the highly compressed zone under large buildings, if any, would be elongated or ellipsoid-like, while under small symmetrical ones it would be hemispherical or nearly so.

Photoelectric analogy

As is known, if a thin transparent specimen (celluloid or bakelite) is stressed and polarized light is sent through it by means of a nicol prism, colored fringes can be obtained on a screen by using a second nicol. The lines thus obtained, having the same color, are called "isochromatic" lines; they are also lines of constant principal shearing stress.

For a uniform pressure p (Fig. 3*a*), acting along a strip on the surface of an elastic plate, the isochromatic lines are practically circles passing through the edges of the load O_1 and O_2. At any rate, this is true of narrow loaded strips (2*a*). In his book on "Plasticity" Dr. Nádai showed theoretically that if the material yields along one of these isochromatics, this would happen along the semicircle represented by the heavy line in Fig. 3*a*.

The process of settlement is not static but dynamic. Hence during the settlement the resultant of the forces acting on the boundary line of the semicircular zone is less than the weight of the building, but it steadily increases; and in this process the shearing resistance along the boundary surface may be exceeded. The semicircular zone will then be separated from the rest of the soil, practically in the same way as shown in Fig. 3*a*. This should be visualized as a failure of the bond that connected the zone with the rest of the soil.

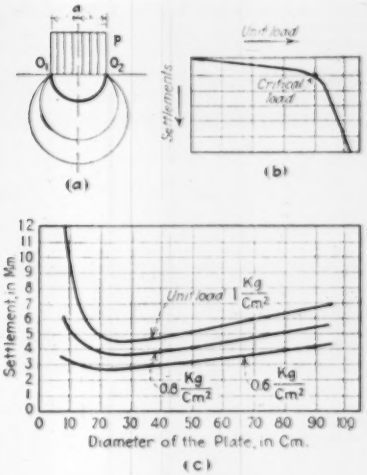


Fig. 3—Graphs showing isochromatic lines (*a*), critical load (*b*), and relation between size of loaded plate and its settlement (*c*).

Critical load

In a loading test as made in building practice settlements first increase proportionately to the load applied, the latter being increased by periodical increments. But when the load reaches a certain critical value, the settlement increases disproportionately (Fig. 3*b*). The limit of proportionality is then said to be reached.

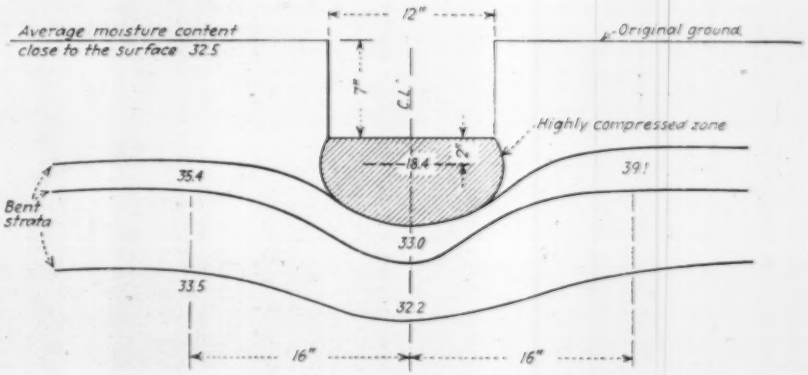


Fig. 2—Moisture distribution immediately after load test at East Hartford, Conn. Figures are moisture content in per cent by dry weight.

In the opinion of the writer, this limit of proportionality has nothing to do with similar phenomena in other materials when tested in the laboratory. Instead, the critical load corresponds either to the breakage of the bonds as shown in Fig. 3*a* or to a lateral shear followed by bulging of the ground around the building. A certain resisting force ceases to exist; hence the more intensive movement (settlement).

Eventual settlement

There is no possibility at the present time of computing exactly the probable settlement of a building from the results furnished by a loading test; the amount of eventual settlement can only be estimated. This is due to our lack of knowledge of the relation that exists between the size of the loaded area and the corresponding settlement. Fig. 3*c* represents some results of the experiments on sand, by Prof. Koegler, of Germany (*Bautechnik*, Vol. 9, p. 358, 1931). The settlement of a round plate appears to be at a minimum when its diameter is about 1 ft. Under the same unit load both larger and smaller plates settle more. The critical diameter seems to be different for different soils.

The above uncertainty is caused by the difference of soil action at the perimeter of a plate and at its middle. Probably the soil under the central part of a large plate or of a building is simply compressed by the total amount of the load, while along the perimeter counteracting vertical components of shear resistance probably are to be found, and lateral displacement takes place. There is an alternative before the research worker: (1) either to study carefully the physical nature of the perimeter action and to eliminate its effect by computation; or (2) to try to destroy that effect materially and to make a small plate work similarly to a large one. The former way has been followed till now. There is certain hope, however, that according to the results of the described East Hartford experiment, perhaps the latter way also may be explored. In this connection further intensive research is needed. No loading test, however, can give satisfactory results if this cause of settlement is located in deeper strata. Hence the necessity of a good geological reconnaissance.

The writer was able to make the experiment shown in Fig. 1 and 2 owing to the kind cooperation of both the Connecticut state highway department and the director of public works of East Hartford, Conn.

Building a Bridge in Three Strips

To maintain traffic during replacement of old Klingle Valley Connecticut Ave. bridge in Washington, D. C., a section of the new bridge was built complete on either side before old bridge was demolished—Result is unusual spacing of arch ribs in new structure

By H. C. Whitehurst
Director of Highways, District of Columbia, Washington, D. C.

THE NEW steel-arch span carrying Connecticut Ave. over Klingle Valley in Washington, D. C., is a monumental steel-arch structure in which the four ribs occur in pairs under the outer quarter of the deck width as a direct result of a construction expedient required by the necessity for maintaining traffic at all times. Thus the old bridge that was replaced was kept in service until the outside portions of the new bridge were completed. It could then be removed and the center portion of the new bridge filled in while traffic was diverted to the outside lanes.

Klingle Valley is a wooded arm of Rock Creek Park, providing a means of access by Klingle Road to the park drives. For 40 years Connecticut Ave. has been carried over the valley by a light and narrow viaduct of simple truss spans on braced towers, which was built by the traction company. Connecticut Ave. is an important arterial highway carrying about 30,000 vehicles per day, including bus lines and street-car tracks. In the absence of suitable detours it was imperative that trolley, vehicular and pedestrian traffic be maintained, in both directions, throughout the construction of the new bridge. Past experience in Washington had demonstrated the pressure on main highways to carry continually increasing volumes of traffic. In planning to remove a bottleneck slightly less than 40 ft. wide, from a street elsewhere 60 ft. between curbs, it was desired that the new bridge should permit at some future date of an 80-ft. roadway, if it should ever become necessary to widen Connecticut Ave. to that extent.

These were the controlling conditions. The element of time was also important, as it was desired to have the new bridge finished before the spring of 1932 should bring the usual tourist traffic. Preliminary studies of a masonry and of a steel design were submitted, and the commissioners of the District of Columbia selected the steel-arch type, which was

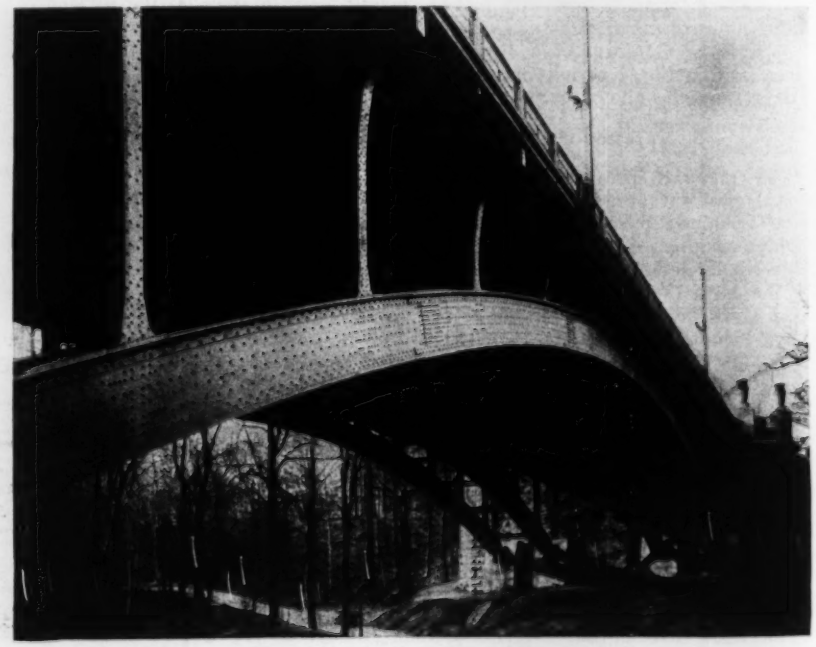


Fig. 1—Klingle Valley bridge in Washington, D. C., in which unusual arch-rib spacing resulted from building new bridge around the old structure that was replaced. Note rigid-frame treatment of rib sway-bracing and of columns and girders that support roadway.

subsequently approved by the Fine Arts Commission. To permit comparison of the two preliminary designs, complete architectural renderings in elevation and perspective were made, together with a model of the topography into which temporary paper bridge models were fitted. When the final design was developed, the model was finished in permanent form.

The adopted design is a 250-ft. steel-rib arch span on stone-faced hollow abutments. To keep the valley as open as possible, the arch was sprung from points as far up the slopes as was practicable. The curve thus was of necessity flat, having a rise of 28 ft., or 1/8.9.

A heavy loading was assumed. For the ribs this was two 40-ton street-railway cars on each of the two tracks, with remaining roadway space loaded at 150 lb. per sq.ft. and sidewalks at 50 lb. per sq.ft. The floor design was controlled by 32,000-lb. double-axle loadings spaced 4.5 ft. on centers for the car tracks, 26-ton trucks with 10,000 lb. on the front and 42,000 lb. on the rear axles for the remaining width of the roadway and 100 lb. per sq.ft. on the sidewalks. Impact was deemed included in these loadings. All arch-rib main material and splice material is silicon steel. All other structural material is medium carbon steel.

Fig. 2—Building new bridge outside old bridge while Connecticut Ave. traffic uses old bridge.

In cross-section the arrangement was dictated by the necessity of carrying traffic at all times. The new bridge was designed to be constructed in three parallel strips. Two arch ribs were placed on either side of the old bridge with the inner rib as close as possible to the columns of the old viaduct. These side portions constituted temporarily independent structures, which carried traffic while the old bridge in between was being demolished and the remaining or center portion of the deck filled in. The ribs are spaced 17 ft. 6 in., 35 ft. 0 in. and 17 ft. 6 in. For the present 60-ft. roadway this results in the two inner ribs carrying more than one-half the load. If, however, the roadway should at some future time be widened to 80 ft., the resulting overhang of the deck will equalize the load on the four ribs. All ribs were made alike. The section is parallel between quarter points and is 4 ft. 6½ in. deep, tapering to 4 ft. 0½ in. back to back of angles at the ends. The maximum area is 372.76 sq.in. gross.

A preliminary investigation was made of a rib three-hinged for dead load and two-hinged for live load. This did not have sufficient advantages to offset the complication of a temporary central hinge. As built, the ribs are two-hinged for both dead and live load. They were fabricated to a length of 250 ft. 0⅞ in. at 55 deg. F. and were assembled in the shop to check the accuracy of this length and the milling of the joints. As the bearings were built 250 ft. 0 in. apart, the ribs were cambered by being carried high at the center during erection, so that the closing sections could be entered.

Fig. 3—Old bridge being demolished to be replaced by floor beams spanning between completed portions of new bridge at either side, which in the meantime are carrying street railway and vehicular traffic.

The concrete slab floor being inevitably the stiffest element of the structure for transverse loading, all lateral bracing was concentrated at this plane. Two lateral systems were provided, one above each outer pair of ribs so as to function while they were carrying traffic as independent structures. These laterals deliver horizontal forces to reaction bearings on the front faces of the abutments. The arch ribs are stiffened laterally to a considerable degree by the verticals, which frame into the floor beams at their top and between the webs of the rib section at their bottom. The outer pairs are tied together by transverse struts, but there is no other lateral system between the ribs. The concentration of horizontal bracing in one plane and the

Fig. 4—Roadway of Klingle Valley bridge on Connecticut Ave. is 60 ft. wide, with provision in structure for widening to 80 ft.

use of rigid frames transversely eliminates minor secondary members and permits emphasis of the major structural elements.

The abutments are hollow, carrying a steel-framed floor system on steel columns that are incased in concrete or embedded in the side walls. All exposed surfaces are stone masonry, the walls being of local rubble, with corner elements of rock-face Pennsylvania sandstone backed with concrete. The dressed masonry, which includes skewbacks, coping, parapet and ornamental stone lantern bases, is of variegated Indiana limestone. The metal hand-railing on the arch and on similar panels introduced in the stone parapet are of wrought iron with cast inset panels.

As the abutments are constructed the full width required for an 80-ft. roadway, the sidewalks in this portion are at present very wide and give the effect of plazas at each end. The principal ornamental features above the level of the deck are eight bronze lanterns on fluted stone urn-shaped bases. In consideration of the residential neighborhood, stone benches are provided along the parapet wall in the abutment section.

Thus the whole operation of both design and construction was planned and executed so that traffic was continued without serious inconvenience or delay. The work was completed in a month less than the contract time of nine months.

The Klingle Valley bridge was designed by Modjeski, Masters & Chase, with Paul P. Cret as consulting architect. It was constructed under the direct supervision of C. R. Whyte, engineer of bridges, department of highways, District of Columbia, with Albert R. Green as resident engineer. The contractor was the W. P. Thurston Co., Richmond, Va.

Letters to the Editor

Retaining-Wall Models

Sir—Continuing the correspondence on models of earth action: Model tests of the action of earth have been used for a number of years at Purdue University. One useful demonstration embodies alternate layers of dark and white sand back of a model of a retaining wall, transverse to one end of which is a glass plate. A rapid tilting of the retaining-wall model by an instructor exhibits what the student usually finds difficulty in understanding—namely, the so-called wedge of rupture.

With a horizontal surface of sand back of the wall it is seen that the plane of rupture, as analysis indicates, bisects the angle between the vertical back of the wall and the angle of repose of the material.

Lafayette, Ind., Nov. 29, 1932. W. K. Hatt, Purdue University.

Why Use Corewalls?

Sir—In your issue of Nov. 3, 1932, F. A. Noetzli describes the tilting and shearing of a corewall in a dam in northern Africa; and he presents in concise language sound arguments against the use of rigid masonry corewalls in rockfill dams.

On p. 530 Mr. Noetzli says: "A rockfill dam with a vertical corewall in the center leaves only about one-half of the fill—namely, the downstream portion—avaiable for resisting the water pressure. Horizontal compacting of the fill due to the horizontal pressure of the water upon a nearly vertical corewall is unavoidable, because even the best kind of fill is at least slightly compressible. This introduces a tendency of shearing off a vertical corewall at the foundation."

If these statements be sound as regards rockfill dams, are they not also applicable to earthen dams? An earthfill is certainly subject to some displacement, the amount being dependent upon the character and state of compactness of the material and the applied load.

Yet in a recent edition of a standard text on dams the following statement appears: "Masonry corewalls (concrete or rubble masonry) are doubtless the best means of insuring watertightness in an earthen dam and should generally be adopted when the means at disposal will permit their use." And on another page of the same text it is stated that although a masonry corewall "will generally be found more expensive" than "a homogeneous bank of earth" or "a bank of earth having a puddle-core," it has "great advantages as regards safety."

Space will not permit the presentation in this letter of the arguments for and against masonry corewalls. Many have been built and, if the facts were known, perhaps many have deflected sufficiently to crack and permit leakage. "Nevertheless these walls stand" is a quotation from the same standard text and seems to be the best argument for persisting in their construction, in spite of "the fallacy of trying to support a relatively stiff seal wall by fill material," using the words of Mr. Noetzli.

Why then should engineers continue the advocacy and use of a device that is theoretically unsound? Not because other means are lacking to produce the desired result. Presumably the principal function of a corewall is to afford water seal. Yet, as Mr. Noetzli points out, a far superior method of sealing a rockfill dam, where nothing but rock is available, is illustrated by the recent designs of several dams in Chile (*ENR*, Nov. 5, 1931, p. 725) where a *flexible* seal was placed upon the upstream face. As to the leakage through earthen dams, is it not possible in the great majority of cases to make an earthen embankment relatively tight through the proper selection and placing of available material? Obviously, if there be a path of leakage under a well-built embankment through a porous underlying stratum (and such is often the case), a cutoff of some sort will be required. But does that mean a cutoff or corewall carried to the top of the "placed" material?

If added "safety" be the purpose of a corewall in an earthen dam, this objective may be more effectively and economically accomplished through adequate drainage, without a corewall. By this means a larger proportion of the filled material is kept dry and available for stability. If the natural drainage of the placed material is not sufficient, artificial drainage should be added. In fact, in the writer's experience, including more than twenty years of association with the late Gardner S. Williams in the field of water power, all our earthern dams have been underdrained in their downstream portions and none have contained corewalls. The results have been satisfactory. These dams are all nearly watertight, and the immaterial leakage is probably decreasing with the years. The downstream slopes are dry and the stability, with less than normal cross-sections, is beyond any question.

Ann Arbor, Mich., Nov. 26, 1932. Louis E. Ayres, Consulting Engineer.

Sound Engineering Principles Violated in Oued Kébir Dam

Sir—Mr. Noetzli's description, in your issue of Nov. 3, p. 529, of the troubles with the Oued Kébir rockfill dam of Tunis adds little new knowledge to the existing art but merely confirms previously well-known principles.

The design of this dam defied the well-established principle that a structure such as a corewall of any kind of dam must either be strong enough to support the maximum load imposed upon it or else flexible enough to yield to this load without injury.

The design in question constitutes the maximum violation of both alternates, because it provides a weak structure compared with supported loads and yet minimum flexibility to accommodate inevitable deflection.

It is obviously impracticable, if not impossible, to design a corewall heavy enough to resist the enormous and indeterminate loads of water plus rock settlement; the opposite extreme of maximum flexibility is therefore the essential alternative, not only for the corewall of a rockfill but also of earth dams.

This basic principle was also violated perhaps more often than it was observed in the case of earth dams by the use of heavy inflexible corewalls until recent years, but real harm seldom resulted because the earth itself in most cases was as tight as the corewall and effectually concealed the inevitable cracks of the latter. A rockfill offers no such protection against the results of incorrect design.

It is believed that the merits of the long-established American practice of a flexible face on the upstream slope of a rockfill dam have been amply proven by the costly Oued Kébir experiment.

One condition is very interesting and, I believe, newly revealed by the failure —namely, that the deflection of a rockfill is partly elastic as shown by the partial return of the corewall to its original position by drainage of the reservoir.

Chicago, Ill., Nov. 16, 1932. L. F. HARZA, Consulting Engineer.

New Pile-Bearing Formula

Sir—In the article "New Pile-Bearing Formula from Model Pile Tests," *Engineering News-Record*, Nov. 3, 1932, a typographical error appears in two places.

The equation $P = \frac{CS^2}{3}$ (p. 524, col. 3, and p. 525, col. 1) should be $P = \frac{CS^2 l}{3}$.

Detroit, Mich., Nov. 17, 1932. L. C. WILCOXEN.

* * *

Sir—Mr. Wilcoxen's article, "New Pile-Bearing Formula from Model Pile Tests," carries the following statement by the author (p. 526): "By the use of impact tests upon model piles a new pile-bearing formula has been developed that the writer feels sure to be correct for all types of soils."

The author's formula $P = \frac{Wh}{S^n}$ is not radically different from some of our well-known formulas. It is similar to the *Engineering News* formula, and for n equal to unity it is identical with Sander's formula.

The *Engineering News* formula may be derived from the theory of semi-elastic impact *if certain assumptions are made*. An investigation of these assumptions should be ample proof that no pile formula of this type will fit all soil conditions. These are the assumptions: (1) Perfect elastic impact. (This cannot be true for a general condition.) (2) One term involving the modulus of elasticity and the dimensions of the pile is neglected. (This term will be appreciable in some cases.) (3) The ultimate bearing capacity of a pile under static load is equal to the resistance against penetration under impact.

Assumption (3) is basic to the author's formula and to all other similar pile formulas, but many full-sized tests, interpreted in the light of our present knowledge of soil mechanics, show very conclusively that this assumption is extremely illogical for all soil conditions. For example, consider briefly a pile being driven into soft clay.

The full static friction of the pile is not developed until one to four days after driving has stopped. Therefore, the frictional resistance against impact is much less than that against a static load. Conversely, the point resistance against impact is greater than that against static load. (This may be explained by Dr. Terzaghi's theory of consolidation. See *Engineering News-Record*, Nov. 5, 12, 19 and 26, 1925.) With this in mind it is apparent that assumption (3) is incorrect for a general case.

There are other methods of analyzing this subject, but the conclusions are the same; and from an experimental point of view many full-sized tests conclusively show the error of placing faith in pile formulas when the supporting material is soft clay or fine silt.

The writer does not doubt the validity of the author's formula representing the conditions of his experiments. However, the writer feels justified in saying that the author overlooked too many variables when he claimed to have developed a pile formula "sure to be correct for all types of soils."

ROY M. HARRIS, Graduate Student in Civil Engineering, University of Washington.

Seattle, Wash., Nov. 11, 1932.

Earth Dams in Hawaii

Sir—I was extremely interested in reading the article by Joel B. Cox on the tribulations of the Alexander Dam on the Island of Kauai in the Hawaiian Islands.

Having spent nearly seven years in this territory between 1899 and 1906, engaged in making examinations, reports, and doing construction work on water supplies, I may claim to be as familiar as anybody with the geological structure of the different islands, having dug some 15 miles of tunnels in Kauai in 1902 and 1903, 10 miles in Hawaii in 1904 and 1905, and 10 miles in Kauai in 1905 and 1906. Nearly all the rock in the islands is supposed to be formed by volcanic action, the volcanos expelling molten lava which descended toward the surrounding water level in successive layers.

In making the tunnels I penetrated this material and found that the rock is mostly composed of the consolidated lava solidified, which stood very well under excavation without the use of timbers. Most of the tunnels I made down there were for a total cost of less than $4.50 a foot, for tunnels 6 ft. high and 7 ft. wide. Occasionally the rock formation showed a belt of basalt, which was dense, hard and costly to excavate. This material appeared in seams or dikes down through the other formations, and was generally of short lengths not exceeding 200 ft.

The surface soil is mostly composed of disintegrated lava dust and is very light and porous, so that it lends itself readily to irrigation. Very successful crops of sugar cane are grown on the farming parts of the islands with water developed either from the mountain streams by means of tunnels or aqueducts, or water obtained from wells.

Mr. Cox writes an interesting article explanatory of the drainage system that he installed, which is certainly an innovation in hydraulic-fill dams. The cause of the failure was a superabundance of liquid mud in the central core of the dam. Like causes produce like effects. The same may be said of the Necaxa Dam in Mexico and Calaveras Dam in California. I beileve common sense rather than soil mechanics should be the controlling factor in segregating materials in any kind of a dam. J. B. Schuyler, of the Necaxa Dam, said that the owners used a rock of light specific gravity which was cheaper than the heavy rock he recommended. The owners had to pay the bill, no matter what caused the slide.

I believe Mr. Cox makes a grave lexicographical error in using the innovation "beach section" in referring to any portion of the dam. The term beach applies to the ocean shore or to wide river embankments and is not, in my judgment, applicable to any portion of a dam.

He is to be commended for the ingenious drainage system that he installed, which is very scientifically done and develops a new field in dam drainage. A far better substitute than the drains would be to provide an ample amount of solid clean rock on both slopes of the dam, which would always be available to drain superfluous water out of the center of the dam. Mr. Cox is to be commended for the frank statements that he makes relating to all features of the construction, which are of educational value to engineers.

The slide occurred on March 26, 1930, and it was fortunate that only six lives were lost and about $80,000 of damage was done. The structure is a warning to engineers to beware of composite types on construction and to be always on their guard, looking for the smallest symptom of failure.

The McBryde plantation has several earthfill dams built by the old conventional rolled-layer method, none of which I have ever heard has failed. There are several lowhead dams scattered through the Hawaiian Islands that have survived. So I believe there is no warrant for his statement that a selection of a type for this purpose was influenced by failures in other conventional types.

M. M. O'SHAUGHNESSY, Consulting Engineer, Hetch Hetchy Water Supply.

San Francisco, Calif., Oct. 28, 1932.

Engineering News-Record

EDITOR—F. E. Schmitt. EDITORIAL STAFF—V. T. Boughton, W. G. Bowman, F. W. Herring, C. S. Hill, H. W. Richardson, W. W. De Berard, N. A. Bowers, J. I. Ballard.

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Light Is Breaking

ANNOUNCEMENT of lower interest rates by the R.F.C. is the most significant event in the history of the Emergency Relief and Construction Act. Since the act was passed, five months ago, the corporation has operated as a profit-seeking moneylender rather than as an agency of business revival. Its excessive charges as well as its indecision on vital questions of interpretation tended to discourage borrowings for employment-creating construction. That substantially no revival of business has resulted from the R.F.C.'s administration of the act is well known; the one-and-a-half billion dollars of available money remain idle (only a few hundred thousand dollars have been paid out), and few men have been put to work out of the thousands who might be back in the ranks of wage-earners. In the meantime the market for prime state and municipal securities improved, to the point where the interest rates of the R.F.C. were quite out of line. The reduction of one-half per cent may therefore mean nothing more than that the corporation is following the market down. But it may also mean that the corporation is preparing to take a new attitude toward its mandate and that it will in future operate less as an invesment banker and more as a builder of employment and business. If this proves to be the case, it will mean that light is breaking on the gloom and that fundamental reform of the causes of delay will soon follow as a natural consequence.

Proper Caution

IT IS important to note that the novel code of dam construction promulgated by Arizona reflects proper caution as to laying down rules or otherwise conventionalizing a problem that demands complete freedom of engineering judgment. The code does not prescribe methods or limits of design; it is distinctly not a specification, but instead confines itself to expressing the viewpoint of the state engineer's office in its attitude toward projects submitted for approval. To go beyond this would be not only uneconomical but extremely dangerous. The widely varying conditions affecting an individual project, as well as the continuing evolution of the dam-building art, demand a flexibility of decision that is incompatible with narrow limitations. Even limits set so high as to increase the cost of dams beyond all reason would not assure safety. The specification method of controlling design in the public interest is none too successful even in municipal building codes, for by establishing a certain minimum standard it debases the level of all construction and, without giving full assurance of safety, prevents the attainment of economies which the able and conscientious builder might achieve. In the field of dams these defects are enormously magnified. An indication of current good practice and strong emphasis on the need for individual judgment is all that the problem permits.

A United Front

WITH obvious reason Western interests should agree and unite on matters affecting current reclamation, for though the subject concerns the whole nation it is most intimately related to the West. The National Reclamation Association, formed to support the continuance of the federal reclamation program (*ENR*, Dec. 15, 1932, p. 734), is to be welcomed as providing a centralizing point of Western opinion. Its immediate task is to aid the Bureau of Reclamation's request for a loan to prevent the stoppage of work now under way, and in this it has a strong claim to national support regardless of the question of what the ultimate reclamation policy shall be. Construction work is in progress, large sums have been spent, and crews are at work. Settlers already on the land are waiting for the water supply. Delay in carrying forward these undertakings not only would be poor business but also would cause real human suffering. At present the work of the bureau, with few exceptions, is in relieving distress and salvaging areas with insufficient water supply. This work deserves the united advocacy of the West and the support of the East.

Expense or Investment

THE often-criticized practice of federal bookkeeping in lumping together current expense and productive investment becomes of special significance in its application to the Boulder Canyon project. The whole cost of Hoover Dam, power house and appurtenances is merely a loan, to be repaid by power and water-use charges. Binding contracts for repayment have been signed by the users, and within a few years the construction loan will begin to return with interest. The nation is making an investment, in short, of precisely the same kind as those made by a bank or the Federal Reserve System in buying bills or making a loan. Were a bank to enter its bill purchases and loans in the same account with office rent and payroll, bank statements might be spicy reading, but they would have no meaning. Yet it is on such accounting that government budgets are made up and appropriations are debated. The Hoover Dam appropriation is a relatively small budget item, but it is an appropriate test for this peculiar practice. Reformed accounting in this case would soon lead to studying all federal undertakings from the self-liquidating point of view, a result which has much to recommend it.

Smaller Agitator Trucks

LIGHT high-speed truck delivery of concrete from a central job mixer as described in this issue marks a step in solving the economics of central plant mixing. Today distribution for the large-volume long-haul operation is in large measure solved by the agitator truck and the dry mixture. The truck investment runs high, however, for the small occasional operation. Speed and quick maneuvering are hampered by the large size of the units, and the batches are rather more than can be conveniently handled, particularly when delivery is required at scattered points as in the building construction described. Here excellent control kept the concrete in good condition with transport in ordinary containers. Segre-

gation is, however, always a hazard; a decade ago, after numerous trials, it put the light-truck wet-mix haul out of the count for road construction. The agitator truck has a new field to develop in providing small fast-moving units for operations where frequent delivery is required.

Traffic Service First

THE DEGREE to which service to traffic may overshadow design considerations and normal construction routine is well illustrated by the methods used in construction of the Klingle Valley bridge, described in this issue, and the series of bridges for a New Jersey highway, described a week ago. In both instances sacrifices in simplicity of design and construction procedure became necessary to meet the need of uninterrupted traffic. Such restrictions have long been accepted as unquestionable in railway bridge and track renewal; their acknowledgment now as a normal requirement of highway reconstruction indicates similar understanding of the road as a tool of transportation. This is an important step in the advance of highway thinking, which in many questions of traffic service and regulation is still dominated by the reasoning of a traffic era that has passed.

A Year of Municipal Deflation

THE YEAR now coming to a close has witnessed a deflation in municipal affairs of unsurpassed severity. Even before last January the steadily deepening depression had menaced the normal functioning of municipalities, and in the opening months of 1932 the storm broke. Financial institutions displayed unwillingness to follow their normally profitable practice of advancing operating funds in anticipation of tax collections, and investors declined to purchase municipal bonds. Real estate bodies demanded drastic reduction of governmental expenditures. Tax payments declined until delinquencies reached alarming proportions.

In support of the tax-reduction movement there appeared the country over a vast flood of publicity broadly charging that governmental activities are extravagant, inefficient or of doubtful utility, and making much of the "intolerable burden of taxation." Men high in public esteem lent the support of their names to such charges, and the public at large accepted them. The resulting pressure upon city authorities was beyond resistance. Although expenditures of a capital nature have little immediate relation to current costs, they are among the largest single items of expenditure, and as budgets for the new year came up for consideration city after city placed long-planned public-improvement projects on the suspended list. Thus more thousands were added to the unemployed when the cost of unemployment relief was straining the resources of local governments.

The panic demand for expenditure reduction still continues. The arguments advanced by its spokesmen rest on a foundation of ill-considered statistics and unsound assumption, but they are leading to a hysterical slashing of budgets which is more likely to wreck urban civilization than to effect any real economy.

To give the subject the rational and factual examination that its importance demands, *Engineering News-Record* inaugurated last February a series of articles designed to clear up some of the misconceptions engendered by the deflationary publicity. Five major articles appeared during the year, the concluding one in last week's issue, written in large part by acknowledged authorities in the field of public administration. These articles looked into the real causes of the sudden credit stringency, examined the extent and cost of municipal activity, appraised its efficiency of operation, stated the facts in regard to finances, and made specific recommendations for remedy of shortcomings.

What can be concluded from this dispassionate survey? It is clearly apparent that the city's financial stress resulted from money-tightness and not from inherent faults of its financial structure. In other words, the disorder has been acute rather than chronic. Debts have been burdensome only to the extent that fixed charges on any business become hard to meet when income declines. Unless we are prepared to admit that the depression is to remain with us permanently and that our standards of living, individually and collectively, must be lowered, the attempt to deflate the services supplied by municipal governments is unsound.

The extent to which cities minister to the community needs of their citizens is governed by the level of civilization enjoyed by them or to which they aspire. Comparisons of municipal costs or activities with figures of bygone years are meaningless, because we are of today's civilization and would find bygone conditions intolerable. Municipal current expenditures merely represent the costs of supplying the community services made essential by the conditions of city life. Do those costs seem high? When evaluated in terms of the benefits derived—security, convenience, health and education—they are low indeed.

What are those luxury services upon which we have been wasting our substance? It will hardly be argued that we have safeguarded our health too well. No proposals have been heard that we dispense with any measure of police or fire protection. Public education? Our democracy is dependent upon it, and the rapidly growing complexities of living make its continuing development more than ever necessary. As for paved streets, today's city-dweller-on-wheels would have a sorry time without them. Sanitary measures glaringly illustrate the fact that in many aspects the creation of physical facilities has really lagged far behind the needs of the times. It is useless to claim that services such as these add to the cost of "government." Take them off the city tax roll: their cost remains, merely to be paid to someone else.

The fiscal methods employed by cities are sound in their essentials. Nevertheless there are specific practices that need reform. Chief among them is the widespread practice of maintaining current operations with borrowed money. It leads directly to the domination of the city government by bankers instead of by the constituted officials. As the year closes, that is the position of New York City. The entire budget for 1933 will be drawn to the approval of the city's bankers or there will be no loans forthcoming and operations will be demoralized. And New York is not alone in its plight. The same development has occurred in many places. The remedy is simple, comprising merely an advance of the tax-due dates to conform to the city's expenditure needs. By proper adjustment the need for short-term borrowing can be removed and the possibility of banker control can be avoided. The annual budget is but the tangible expression of public policy with regard to government and should be controlled by properly constituted public officials, not by representatives of a single group. Otherwise, pretensions of democracy are entirely vain.

NEWS OF THE WEEK

1933 Federal Aid For Highway Work Now in Jeopardy

Washington Correspondence

WHILE the appropriations committee of the House of Representatives only recommends the appropriation of $35,000,000 for federal-aid road projects in the next fiscal year, this has no important bearing on the road expenditures that will be made during the fiscal year to end June 30, 1934. The appropriation simply makes available a part of the money which has been previously authorized. If no new authorization bill is passed all of the federal-aid money that could be expended on roads during the next fiscal year would be the appropriation of $4,814,387 which remains of the regular federal-aid highway authorization, plus the tag ends of other authorizations for forest roads and trails. It is estimated that $13,000,000 of the $35,000,000 carried in the House bill will be expended prior to July 1.

New authorizations needed

The really important question is the action of Congress in making the new authorization. The Senate, at the last session, approved an authorization of $125,000,000 for federal-aid during the new fiscal year. The House committee reduced that amount to $100,000,000 and that bill has been on the calendar since May 25, 1932. House leaders refused to allow action at the last session in their effort to hold down on the total amounts authorized. This action has been widely criticized. Had the House passed the bill at that time, before the election, it is hardly likely that the measure would have been vetoed and planning for road work during the next fiscal year could have been going forward in the various states. Ordinarily the authorizations are allocated on Dec. 1 of each year. It will be delayed this year until the House will have threshed ou the question of policy which has been raised. The Speaker of the House declines to recognize anyone for the purpose of bringing the authorization bill before the House. He is understood to be in doubt as to whether or not the country wants to authorize this expenditure under present conditions of the federal Treasury.

Since some of the states will not be able to use up their proportion of the $120,000,000 of emergency road money, legislation will be proposed in the near future extending the time. It is expected that this will pass. This will insure the actual expenditure of the full $120,000,000.

Failure to have authorized funds for the next two fiscal years is regarded as particularly unfortunate at this time, since most of the state legislatures meet in January. Unless prompt action is taken by Congress the legislatures will be uncertain as to the action that they should take with regard to federal-aid appropriations.

Alabama Permits Service Charges for Sewer and Water Financing

Two laws passed recently at the extraordinary session of the Alabama State Legislature permits cities and towns of the state to construct, own, equip and operate works for the collection and treatment of sewage and to purchase, construct and improve waterworks systems through the issuance of revenue bonds. The bonds may not be issued in excess of the statutory limitations on bond issues by cities. It is further provided that they shall be payable solely from revenues derived from the waterworks or sewage system and do not constitute an indebtedness of municipalities. They are, however, secured by a statutory mortgage lien upon the waterworks or sewerage systems. Towns constructing and operating sewage disposal plants are authorized to contract with adjoining towns to render like service to them.

In a brief news item published in our issue of Dec. 15 it was stated that the municipalities of Alabama could not borrow money from the Reconstruction Finance Corporation for municipal work because of the failure of a constitutional amendment providing for such borrowing to pass the legislature. The amendment in question only provided for borrowing money for relief work and not for self-liquidating projects such as are covered by the two acts which did pass.

Mersey Tunnel at Liverpool to Cost More Than Estimates

It was revealed by the preamble of a parliamentary bill recently issued that the Mersey Tunnel project at Liverpool, England, will cost £7,077,800 ($35,389,000), or £1,855,800 ($9,279,000) in excess of the estimate. The bill provides for an extension of the toll period from 25 to 40 years and for a loans equalization fund of £4,000,000 instead of £1,500,000. If in any year the tolls exceed £220,000 the amount of such excess, after providing for certain reserve funds, is to go pro rata in relief of the rates of Liverpool and Birkenhead. A reserve fund not to exceed £250,000 at any given time is to be formed to meet extraordinary claims against the tunnel committee or for renewals, improvements, or extensions of the undertaking. Power is sought to borrow an additional £1,522,300 for the completion of the tunnel, repayable in 80 years.

In the scheme of decoration of the tunnel the Tunnel Joint Committee has decided to include a 6 ft. 6 in. panelling made up of sheets of black glass, faced at the top and bottom and between the sections with stainless steel strip, 1¼ by ¼ in., this being considered the most durable. The order for the whole of the stainless steel has been placed with the English Steel Corporation, Sheffield. As the tunnel is approximately three miles in length, over 25 miles of steel will be supplied to face the glass sheets.

Interest Rates on R.F.C. Loans To Be Reduced

REDUCTION of interest rates was announced by the Reconstruction Finance Corporation Dec. 24. While the directors of the corporation have no thought of departing from their policy of keeping the rate relatively high so that it will be to the interest of all borrowers to transfer their loans to private lenders, it is felt that in view of the low rates of interest now prevailing that a concession of one-half of one per cent should be made on all loans that have been made to all borrowers except regional agricultural credit corporations on which loans the rate is reduced from 7 per cent to 5½ per cent. But under the new arrangement the borrower bears the cost of inspection or appraisal.

Self-liquidating loans

The rate of interest on loans or contracts to aid in the financing of self-liquidating projects will be established in connection with each loan application. However, if a borrower under this section of the law refinances all its loan or contract, or sells all its obligations held by the corporation in connection therewith, during a period of two years from the date its loan or contract is authorized by the corporation, on such a basis that the cost of the money to the borrower is lower than the cost of the money received from the corporation, the borrower will be permitted, during such two years, to repay the corporation on the same yield basis as that upon which the borrower refinances such loan or contract or sells such obligations, provided the return to the corporation for the use of its money will not be less than the rate of 4 per cent per annum.

New loans authorized

The corporation has agreed to buy $500,000 of 5½ per cent water-works repair bonds of the City of Corpus Christi. The money is to be used to repair the La Fruta Dam on the Nuecos River. Four hundred men will be directly employed for six months, absorbing $170,000. The total to be spent for material is estimated at $330,000. A condition of the loan is that the existing structure be inspected by a competent engineer and declared to be of satisfactory and adequate design. The corporation also agreed to purchase $8,000 worth of 5 per cent certificates of the Village of Saranac Lake, New York, to install one-half mile of 10-in. water main.

Loan applications made

An application for a loan of $600,000 to be spent in lining the main canal of the Roosevelt Irrigation District has been made to the R.F.C. by the district.

The Red Bluff Water Improvement District, Barston, Texas, seeks a $3,500,000 loan for the construction of a dam on the Pecos River at Red Bluff, N. M., about 40

miles from Barston to irrigate 40,000 acres of land.

Phoenix, Ariz., has applied to the R.F.C. for a loan of $150,000 for extension of its waterworks facilities to 19 adjacent subdivisions. Gretna, La., plans to apply for a loan of $200,000 for the construction of a waterworks system.

Construction of a dam and reservoir in Ling's Canyon is proposed by the Model Irrigation District, Trinidad, Colo., and application for R.F.C. loan of $300,000 is proposed. At Durango, Colo., the La Platte River Water Users Assn. proposes applying for a loan of $300,000 for the construction of a 30-ft. dam on the La Platte River.

City officials of St. Louis, Mo., have made application to the R.F.C. for a loan of $2,500,000 to finance the construction of additional railroad approaches to the Municipal Bridge across the Mississippi River. The only preliminaries remaining to be carried out before actual construction of two of the more important approaches is an agreement between the cities and the railroads for easements over their rights of way.

Suits Threaten Work on Dam

Threat of litigation from a new source over the construction by the city of Pasadena, Calif., of the Pine Canyon dam on the San Gabriel River in Los Angeles County has been brought to the attention of the Pasadena city board of directors. The San Antonio Irrigating Co. and the Foster and Lugo Ditch Co. jointly have warned the city that storage of water at the dam now under construction or taking it for domestic use will be deemed a trespass on the rights of the irrigating concerns, and that court action will be taken to protect the claims of the companies.

Use of Moffat Pioneer Tunnel for Aqueduct Voted by Denver

The Board of Water Commissioners, Denver, Colorado, Dec. 19, voted to use the pioneer bore of the Moffat tunnel as an aqueduct. It is expected that water from the west slope will be running to the east side about June 13, 1933. The tunnel will bring 54,000 acre-ft. and the estimated cost is $1,000,000. Financing will be done by using money from the sinking fund, no bond issue is thought necessary. The water board has had men engaged in lining the tunnel for more than two years and has maintained it.

The board has called for bids for furnishing and installing a continuous steel pipe or conduit with connections to an intake tunnel and shaft to be installed in about 15,000 ft. of the tunnel between the apex and the west portal.

Bids Called for Irrigation Project on Euphrates River in Iraq

The Iraq Government, according to reports in London, has called tenders for the first part of a large irrigation scheme, that of providing an off-take from the Euphrates River near the town of Ramadi for the diversion of flood waters to storage reservoirs. The project is estimated to cost about $6,000,000.

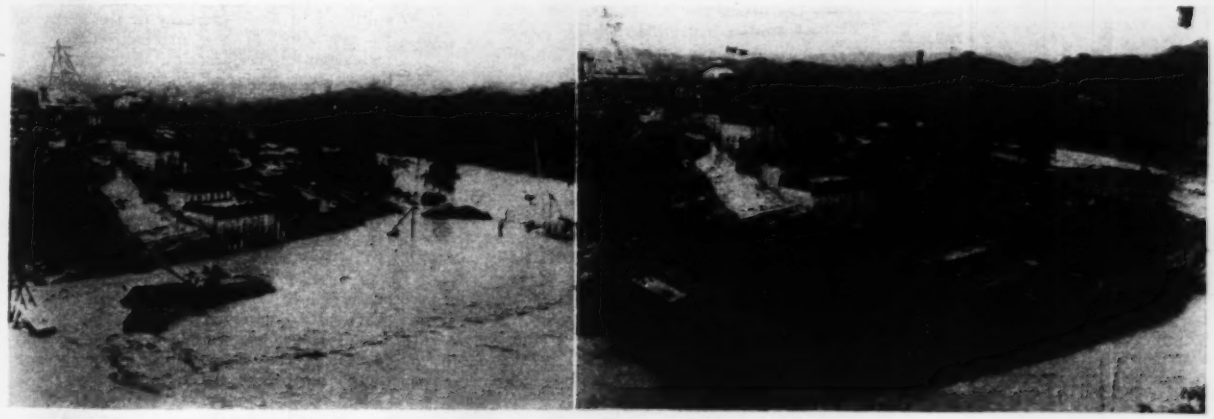
The proposed channel will run into the great Habbaniya depression and will be used to fill it whenever the Euphrates reaches a certain level. Thereafter in any given year one of two things will happen. If the flood proves to be exceptionally large, another channel at the south end of the depression will be opened to let the surplus water from the river, after having entered Habbaniya, escape into another and still greater depression, the Bahr al Milh. In a normal year, however, the escape to the south will not be used, but in all years the Euphrates water stored in Habbaniya itself will be kept there until late summer, when an outlet near Feluja will be opened to allow the impounded water to return to the river.

This scheme was first propounded to the Turks by the late Sir William Willcocks. Its virtues are that it protects the lands of the lower Euphrates from undue floods in spring, and gives the cultivators of central Iraq the assurance of more water for their crop in the late summer, when supplies are usually scanty.

Another project is to construct a dam across the Tigris River at Kut, to divert the surplus water of the Tigris into one of the old river channels which still survive. The cost of this scheme is also estimated at about $6,000,000. Tenders will be invited for this work in 1933, as soon as the formalities connected with the Habbaniya have been completed.

Cost of Sydney Harbor Bridge Exceeded Contract Price

Dorman, Long & Co., British steel company that built the Sydney Harbor bridge in Australia, completed the structure at a loss of £247,000, according to a Canadian press dispatch from London. The amount the company lost on the construction of the bridge was made public in its annual report. The company's contract price was £4,250,000. Labor difficulties, strikes and exchange rate inequalities are believed to have been responsible for the loss.



WORK RESUMED AT MADDEN DAM FOLLOWING HIGH FLOODS IN CHAGRES RIVER

Work in the cofferdams for Madden dam in the Canal Zone was only delayed a few days by the unusually high flood of Nov. 28 and little damage was done to the plant of the contractors, the W. E. Callahan Construction Co. and Peterson, Shirley & Gunther, according to a report to this journal by A. J. Ackerman, chief engineer for the contractors.

The accompanying photographs show, at the left, conditions in the river channel at the height of the flood and, at the right, the conditions seven days later. By Nov. 30 the water had receded sufficiently to permit pumping to be begun in the cofferdam and within 48 hours the contractor was again placing concrete in blocks down in the excavation. The only damage to the cofferdam is shown at the extreme right of the right-hand picture where the levee was cut away to a point where pressure from within the cofferdam caused the sheet piling to break.

The principal damage to the contractors' equipment was to the tramway from the gravel pit. Two towers, about a mile from the dam site, were washed out. However, the contractor had a large reserve of gravel in storage sufficient for current needs during repairs.

The flood of 200,000 sec.-ft. noted in our issue of Dec. 1 as the flood flow in the river was actually the spillway discharge at Gatun dam. The total inflow into Gatun lake at the peak of the flood was 320,000 sec.-ft. but the Chagres river furnished only about one-third of this inflow. The actual flow at the dam amounted to 111,400 sec.-ft. Through the facilities of the hydrographic station, the contractor had three hours advance notice of the flood and was able to remove all the small equipment from the cofferdam and to flood it before the walls were overtopped. About four weeks before the flood the contractor had raised the cofferdam an additional 18 in. to protect against a flood of 60,000 sec.-ft. Since 1979 when there was a flood of 176,000 sec.-ft. there have only been 15 floods exceeding a total of 60,000 sec.-ft.

Federal Reorganization Approved and Army River Work Condemned

President Hoover's executive orders calling for the reorganization of federal departments, especially that calling for the establishment of a division of public works in the Department of Interior, were endorsed in a public statement issued last week by the American Engineering Council. The statement laid particular stress upon the advantages to be obtained through transfer of river and harbor work from the control of the Corps of Engineers, U. S. Army, to the proposed division of public works. Non-military work now done by the army engineers would be more efficiently done under a division of public work, said the statement.

The statement condemned the work of the army engineers in the following terms:

"The record of the Corps of Engineers has not been outstanding in regard to satisfactorily and conclusively solving the river and harbor problems of the nation in view of the fact that the Corps has expended in excess of $1,540,000,000 for the work. What have we to show for this large expenditure? To ascertain the real facts would require an extensive investigation by a large force of independent engineers. It is known, however, that the Corps of Engineers has more than $60,000,000 worth of equipment with which they do less than $20,000,000 worth of work per year. Any private contractor would soon be bankrupt who followed such a procedure as to the use of equipment."

Inquiry indicates that the Assembly of Engineering Council was not consulted before this statement was prepared. L. W. Wallace, executive secretary of Council, states that it "was based upon many official actions of Council, Congressional hearings and many documents prepared by Council."

Propose State Water Conservation Plan for Minnesota

Control of the public waters of Minnesota by the Conservation Department supported by a broad comprehensive conservation law is recommended in a recent report of E. V. Willard, director of the Division of Drainage and Waters, to William T. Fox, commissioner of conservation. Other recommendations are as follows: An early start should be made to gather and compile information on the lakes of the state to determine their behavior and properties under natural conditions of supply and outflow, to classify them as to location, area, depth, source of supply, natural fluctuations, adaptability for fish and game life, resort development, storage for water supply, power and flood control. Stream gagings, heretofore intermittent, should follow a plan for at least ten years. Effect of drainage on peat marshes is now being studied. What to do with these drained marshes needs research. An aggressive campaign against pollution is needed. Cooperative mapping, discontinued in 1917, should be resumed.

To pay for the studies it is proposed that water power be charged an annual operation fee of 10 cents per horsepower, rated installed turbine power, and that 10 per cent of the fishing licenses be allotted to the department.

Engineers' Week at World Fair

The week of June 25-30 has been set aside as engineers' week during the Century of Progress Exhibition to be held in Chicago next summer. A general committee, known as the engineering societies committee, has been organized in Chicago under the chairmanship of Harry B. Gear and many of the national engineering societies have scheduled their summer meetings to be held in Chicago during the week set aside for engineers. It is now planned to set aside one day as engineers' day, in which all groups will join in a large conference.

In addition to the summer meetings of the four founder societies, the following have signified their intention to hold meetings in Chicago during that week: American Association of Engineers, American Society of Municipal Engineers, American Society for Testing Materials, American Society of Agricultural Engineers, National Council of State Boards of Engineering Examiners, Society for the Promotion of Engineering Education, Western Society of Engineers, American Institute of Architects.

Licenses for Power Development Issued to State of Illinois

Licenses for the development of power at the Bradon Road dam on the Des Plaines River and for the Starved Rock dam and the Dresden Island dam on the Illinois River have been issued to the state of Illinois by the Federal Power Commission. This is the first time that the commission has issued a federal license to a state. The license for the Brandon Road dam requires that work start on or before Jan. 1, 1934, and be completed within two years. Dates for start of the other projects have not been set. The total installed capacity of the three plants will be in excess of 90,000 hp., that of the Brandon Road plant being 32,000.

The projects in question are on the Illinois waterway. Application was made by the state for a license in 1925 but was delayed pending the Supreme Court decision as to the amount of water that could legally be diverted from Lake Michigan. The present application was amended to suit the Supreme Court ruling.

Grand Rapids Discontinues Scrip In Unemployment Relief

Unemployment relief through the medium of scrip given in return for work on public improvements and redeemable only in city-operated stores has been discontinued by Grand Rapids, Mich. A description of the plan as it was operated during the past two winters appeared in *Engineering News-Record*, Oct. 15, 1931, page 612.

The city has voted to abandon the use of scrip in paying workers and to close the municipal store. Hereafter workers will be given cash, and cash also will be given to persons on the welfare rolls for whom no work can be found. In the place of the municipal store there will be several smaller commissaries but those receiving relief will be under no obligation to trade with them.

It has been estimated that $200,000 will be saved in overhead expenses by abandoning the plan.

$91,000,000 of Highway Money Under Relief Act Allotted

Of the total of $120,000,000 appropriated under the Emergency Relief & Construction Act of 1932, an amount of $91,042,932 had been allotted to the several states at the end of November, according to the Bureau of Public Roads. There remains, therefore, approximately $29,000,000 available for use on new projects before the end of the fiscal year on June 30, 1933. The federal government is to be reimbursd for these expenditures by deductions from regular federal-aid appropriations over a ten-year period beginning with 1938.

The emergency construction program using these federal funds involves 8,942 miles of road at a total estimated cost of $138,711,287. This cost is to be met with $91,042,932 of federal emergency construction loans, $38,249,452 of regular federal-aid funds, and $9,418,903 of state funds.

Legislation for California Irrigation Districts Planned

A committee consisting of bankers and irrigation district executives has been formed to sponsor legislation in the coming California state session to relieve the financial situation in irrigation districts. The plan proposed, as provided in a tentative bill, would be in the form of lending state credit for the refinancing of irrigation and reclamation districts. Such aid would be carried out without additional cost to the state, in accordance with the plans of the committee. The organization meeting was attended by representatives of various interests involved and selected W. D. Wagner, secretary of the Irrigation District Association of California, to name the committee. It was pointed out that agriculture is a basic industry of the state and 80 per cent of the production is from irrigation or reclamation districts. With the present financial distress of many of these agricultural units the matter is to be considered as definitely related to the prosperity of the entire state.

New Albany Water Supply in Use

The new water supply of Albany, N. Y., was turned into the distribution system on Nov. 10. Although the works were practically completed one year and a half ago, serious leaks and construction difficulties at the distribution reservoir prevented the use of the supply.

The water is obtained from a reservoir at Alcove, about 20 miles from Albany, which impounds the flow of the Hannacrois and Basic Creeks. From this reservoir, which holds nearly a two years' supply, the water flows about ten miles through a 48-in. cast-iron conduit to the filtration plant at Feura Bush, where it is filtered and chlorinated before being delivered to the city. The surplus goes to a 100,000,000 gal. reservoir at Loudonville. The works cost about $9,000,000.

The old Hudson River supply will be retained for emergency use for a period of one year after final approval of the new supply by the Water Power and Control Commission.

Advance Studies for Engineers Now Out of Employment

To assist disengaged engineers in improving their professional equipment during the winter and spring, the major engineering societies and the colleges of engineering in the New York-New Jersey metropolitan districts have arranged for study courses in engineering, economics and business subjects under the auspices of the Engineering Foundation. Unemployed or volunteer teachers will conduct the engineering courses under the supervision of members of the faculties of Columbia and New York Universities, Stevens Institute of Technology and the Polytechnic Institute of Brooklyn. The business courses will be special ones given by the faculty of the School of Commerce of New York University. Rooms for classes are to be provided in the Engineering Societies Building, New York, and the Engineering Societies library will put text and reference books at the disposal of class members.

Six courses are being offered in the following subjects, entirely without charge: business finance, sales engineering, power plant engineering, structures and mechanical equipment of buildings, industrial applications of electricity, industrial management. Courses are to be given in the forenoon beginning Jan. 9 and continuing for 20 weeks into May. Requests for information and application blanks, accompanied by a statement of educational qualifications, should be addressed to P. H. Littlefield, Engineering Foundation, 29 West 39th St., New York.

Relief Work in Los Angeles Started by Power Bureau

A broad construction program which will furnish half-time employment for about 800 men through a total expenditure of $1,276,779 will be started in December by the department of water and power of Los Angeles, Calif. E. F. Scattergood, general manager of the bureau of power and light, has recommended that the work on a number of projects be put under way at once, the funds to come from the bureau's surplus. Major items of the program include installation of conduit and cables, installation of additional equipment at the Los Angeles River receiving station and the Central Avenue station, and construction of a new distributing station at Palms.

Hoover Dam Notes

Work of excavating the outlet tunnels for the Nevada diversion tunnels at Hoover Dam was practically completed during the week ended Dec. 17. The excavation at the sites of the valve houses also was nearly completed on the Nevada side and was begun on the Arizona side. The top 24 ft. of the upper adit on the Nevada side have been driven 62 ft. at the end of the week.

The cut-off wall on the Arizona side of the upstream cofferdam was completed. Excavation for the downstream cofferdam and rock barrier was resumed Dec. 15. Excavation in the river tunnel below the upstream cofferdam is continuing. Work has begun on the adit for the downstream plug of tunnel No. 2.

Frank W. Skinner Dies

Frank W. Skinner, consulting engineer, writer and lecturer on engineering for the past 18 years and formerly associate editor of *Engineering Record*, died in New York on Dec. 24 following a long illness, age 74 years.

Frank W. Skinner was born in Brownsville, N. Y., June 6, 1858, and graduated as a civil engineer from Cornell University in 1879. After a year in the office of the Pittsburgh Bridge Co. he was appointed an assistant engineer on the reconstruction of the railroad suspension bridge across the Niagara River. On completion of this work he was for a time with the Delaware Bridge Co. and then with the New Jersey Steel & Iron Co. In 1884 Mr. Skinner went to Montreal to become principal assistant and later resident engineer for the Dominion Bridge Co. on the construction of the St. Johns Bridge in New Brunswick, the second cantilever bridge built in America. From 1886 to 1887 he was bridge engineer for the St. Paul & Northern Pacific Railroad, returning East in 1887 to become assistant engineer on the construction of the Washington arch bridge at New York.

In 1887 Henry C. Meyer, publisher of the *Sanitary Engineer and Construction Record*, desiring to expand the scope of his journal, engaged Mr. Skinner to contribute articles on structural engineering, on foundation work and on the technique of construction, a subject then not adequately covered in any publication. Subsequently Mr. Meyer engaged Mr. Skinner as an associate editor. He remained as an associate editor of that journal and of its successor, *Engineering Record*, until 1914, but during the latter part of the period he devoted considerable time to consulting engineering work and to lecturing on field engineering in the College of Civil Engineering at Cornell University from 1894 to 1904. In 1915 Mr. Skinner founded the publication *Contracting* and served as its editor until 1920. From 1920 to 1922 he served as associate editor of *Public Works*.

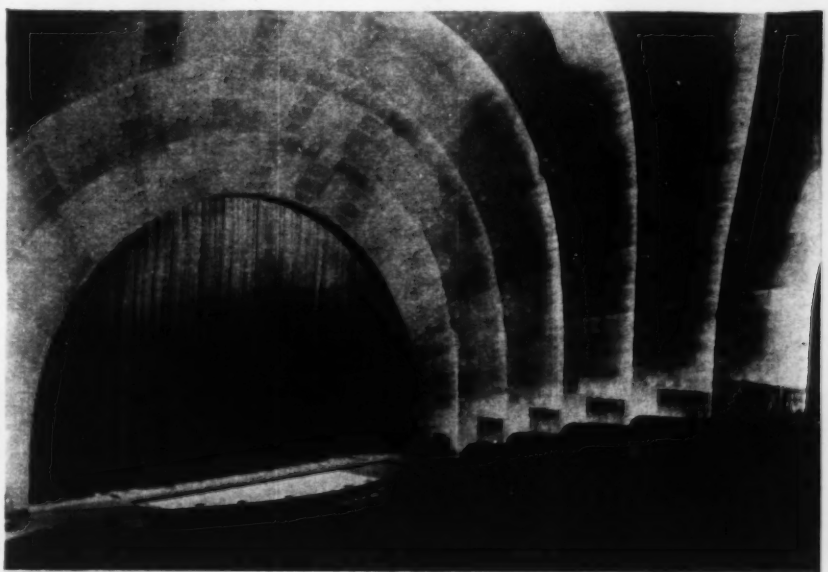
In recent years Mr. Skinner devoted his attention chiefly to writing and lecturing on engineering subjects, specializing largely on structural engineering. He was author of numerous books, among them "Arch Bridges" and "Specifications and Standards."

Hoover Dam Appropriation Cut $2,000,000 by Committee

Washington Correspondence

A reduction of $2,000,000 has been recommended by the appropriations committee of the House of Representatives in the appropriation for the Hoover Dam project. The budget recommended an appropriation of $10,000,000. It is known that the contractor is in a position to use even more than $10,000,000 if the project is to be pushed as rapidly as possible toward completion. It is true that the work is far ahead of schedule but that brings nearer the date when it will begin to produce revenue. Indications are that the Senate will restore the $2,000,000 cut out by the House committee, as there will be no difficulty in establishing that that amount and more can be used to advantage.

The $10,000,000 carried in the emergency act for the project has not been touched. This is due to the fact that it contains conditions as to hours of work which are not regarded as practicable under the special conditions which exist at this project. It is possible that some exception may be made which will make that money available.



Wide World Studio

MUSIC HALL THEATRE, ROCKEFELLER CENTER

Radio City Music Hall, the largest theatre in the world, was opened on Dec. 27. Its unique structural features were described in *Engineering News-Record*, Nov. 17, 1932, p. 583. In the completed view of the auditorium above are shown the suspended ceiling whose overlapping arched segments conceal the four-color lighting units; the 100 ft. diameter semi-circular stage curtain; the orchestra pit elevator (in raised position); and the terraced stage extension that extends around the sides of the auditorium. The balconies are shallow and out of range of the camera.

Low Bid of $8,600,527 for Dam of Flood Control Project

A low bid of $8,600,527 for the construction of San Gabriel Dam No. 1, Los Angeles County Flood Control District, was received by the district when new bids on the dam were opened on Dec. 19. The bid was from the West Slope Construction Co., a company made up of Bates & Rogers Construction Co., Chicago; Foley Bros., St. Paul; and Lawlor & Maguire, Butte, Mont. The company has its headquarters in Los Angeles.

Two bids were called, one for facing the dam with gunite and one with a poured slab. It is to be a rock-filled structure. The bids were as follows:

Bidders	Gunite Face	Poured Face
West Slope Construction Co.	$8,600,527	$8,633,032
Constructors, Inc.	8,767,415	8,767,415
Silas Mason Co.	8,934,869	8,891,529
J. A. McEachern } Guy F. Atkinson }	9,052,899	9,020,394
Merritt-Chapman & Scott	9,968,255	9,903,245
Walsh Const. Co.	10,189,500	10,146,160
Rosoff Subway Const. Co.	10,220,370	10,198,700

The engineers' estimates of the cost are $8,655,555 and $8,612,215 for the gunite and poured concrete face respectively.

This is the third time bids have been received for this dam. On Aug. 1, when bids were first opened, only one bid of $11,270,043 and $11,315,868, respectively for gunite and poured face, was received from Constructors, Inc. That bid was rejected and new bids, with some modifications in specifications were called. Several bids were received on parts of the work but only one bid, again from Constructors, Inc., of $11,268,978 and $11,236,473 was received and all bids were rejected. Further amplifications in the specifications were made, especially as relating to the location of rock satisfactory to the engineers, and bids were called for December 19.

River and Harbor Construction for 1934 to Total $40,000,000

The amount of money that can be profitably expended on the maintenance and improvement of existing river and harbor work for the fiscal year 1934 is $39,388,000 according to the report of the Chief of Engineers to Congress. The major items are given in the following table:

MAJOR ITEMS—RIVER AND HARBOR WORK—FISCAL YEAR 1934

Coast Harbors	Improvement	Maintenance
New York Metropolitan District	$ 245,000	$ 1,150,000
Delaware River, Philadelphia to Sea		1,960,000
Sabine-Neches Waterway		500,000
Honolulu Harbor	300,000	
Columbia River at Mouth		1,100,000
Columbia and Lower Willamette	60,000	685,000
Intracoastal Waterways		
Cape Fear, N. C., to Winyah Bay, S. C.	320,000	
Jacksonville to Miami	600,000	150,000
Caloosahatchee River-Lake Okeechobee Area	2,842,000	
New Orleans-Sabine River	718,000	140,000
Inland Waterways		
Mississippi between Ohio and Illinois Rivers	600,000	1,100,000
Mississippi between Illinois River and Minneapolis	405,000	895,000
Illinois River	710,000	410,000
Missouri River	700,000	2,500,000
Tennessee River	200,000	300,000
Ohio River	2,165,000	1,200,000
Kanawha River	478,000	
St. Mary's River	540,000	70,000
St. Clair River	464,000	
Detroit River	3,294,000	
Total (all work including items not listed above)	14,947,000	* 24,441,000

SOCIETY CALENDAR

AMERICAN CONCRETE INSTITUTE, annual meeting, Chicago, Feb. 21-24.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, Detroit, Mich., Jan. 16-18.

AMERICAN ROAD BUILDERS ASSOCIATION, annual convention and road show, Detroit, Mich., Jan. 16-18.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, New York, N. Y., Jan. 18-21.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, annual meeting, Detroit, Mich., Jan. 16-18.

AMERICAN TOLL BRIDGE ASSOCIATION, annual meeting, Camden, N. J., Jan. 16-17.

AMERICAN WOOD PRESERVERS ASSOCIATION, Chicago, Ill., Jan. 24-26.

ASPHALT INSTITUTE, Asphalt Industry Conference, Detroit, Mich., Jan. 18.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, annual convention, Detroit, Mich., Jan. 16-18.

CONSTRUCTION LEAGUE OF THE UNITED STATES, Detroit, Mich., Policy committee assembly, Jan. 21.

HIGHWAY AND BUILDING CONGRESS participated in by twenty national engineering societies and trade associations, Detroit, Mich., Jan. 16-20.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Detroit, Mich., Jan. 17.

ENGINEERING INSTITUTE OF CANADA, annual meeting, Ottawa, Ont., Feb. 7-8.

NATIONAL CRUSHED STONE ASSOCIATION, annual meeting, Detroit, Mich., Jan. 16-18.

NATIONAL READY MIXED CONCRETE ASSOCIATION, annual meeting, Detroit, Mich., Jan. 17-18.

NATIONAL SAND & GRAVEL ASSOCIATION, annual meeting, Detroit, Mich., Jan. 16-18.

PORTLAND CEMENT ASSOCIATION, Detroit, Mich., Jan. 16-18.

LOS ANGELES SECTION, American Society of Civil Engineers, at its annual meeting December 14 installed the following officers for 1933: President, Ormand A. Stone; vice-presidents, Gerald Fitzgerald and Alfred Jones; secretary, A. L. Gram; and treasurer, K. Q. Volk. The meeting was attended by 175 and the program included a description of progress on Hoover Dam by Walker R. Young, construction engineer, U. S. Bureau of Reclamation, illustrated by slides and motion pictures; also a brief discussion of the policies of the State Board of Registration for Civil Engineers, by H. J. Brunnier, president of the board.

METROPOLITAN SECTION, American Society of Civil Engineers, at a meeting held in New York Dec. 21, was addressed by Robert Ridgway, consulting engineer to the Board of Transportation of New York City, and a member of the Colorado River Board on Hoover Dam and developments leading up to its construction. The talk was illustrated with lantern slides. Charles P. Berkey, geologist, Columbia University, also a member of the Colorado River Board, followed Mr. Ridgway with a detailed discussion of the geology of the Colorado River Valley and of the site of the dam.

At a meeting of the board of directors of the section held in advance of the section meeting the board voted to contribute $500 to the administrative work of the Professional Engineers Committee on Unemployment.

Personal Notes

GEORGE B. HUGHES, Virginia, Minn., has been promoted to the position of division engineer, Minnesota highway department, to succeed the late C. A. Forbes. GEORGE LARSON, county engineer of Wabash county, succeeds Mr. Hughes.

ROBERT V. LABARRE, consulting engineer, and FREDERICK J. CONVERSE, California Institute of Technology, have announced the opening of a consulting office, Labaree and Converse, specializing in foundation practice, in the Chamber of Commerce Bldg., Los Angeles.

CHARLES E. MCKEE, division engineer, Ohio State Highway Department at New Philadelphia, has been appointed chief engineer of maintenance to succeed GROVER C. SNYDER, who resigned. Mr McKee is a graduate of West Point and served as a captain in the Corps of Engineers during the World War.

HUGH MILLER, professor of civil engineering at Union College, Schenectady, N. Y., since 1926, and professor of civil engineering at Clarkson College of Technology, Pottsdam, N. Y., from 1900 to 1915, has announced his resignation to become effective at the end of his year of leave of absence which he plans to take at the close of the present college year. Professor Miller at one time served as dean of the College of Engineering at George Washington University.

Obituary

D. H. HOWARD, engineer of track elevation with the Chicago Rapid Transit Lines, died in Lafayette, Ind., Dec. 21. He was 55 years old and a graduate in 1900 of Purdue University. Previous to his work for the elevated lines in Chicago he was with various railroads including the Pennsylvania, Southern Pacific and Chicago and Alton.

W. S. DINWIDDIE, 61, well-known San Francisco contractor and builder of many important buildings on the Pacific Coast, died suddenly at his home December 22. He was the founder and head of the Dinwiddie Construction Co. established in San Francisco eighteen years ago when he came west after resigning a connection with the Thompson-Starrett Building Corp. of New York. Some of the major structures built by the company include the Russ Building, Golden Gate Theater and Southern Pacific terminal warehouse in San Francisco, in addition to several structures on the University of California campus and the Meier-Frank Building in Portland. Mr. Dinwiddie was a member of the Impartial Wage Board which recently completed its comprehensive findings on the new San Francisco wage scale.

Brief News

A SAVING OF $2,000 on the recently completed Santa Fe sewer project in Oklahoma City is reported by L. M. Bush, city engineer, through doing the work as "made work" to relieve unemployment. Laborers were paid $2 a day. The job cost $62,634 as compared with $64,277, the lowest bid for doing the work by contract.

TO ENFORCE PAYMENT OF PREVAILING WAGES in Seattle, Wash., the city officials plan the passage of an ordinance designed to put teeth in the present law. The proposed change will require contractors to make affidavits as to the accuracy of their payrolls so that they can be prosecuted for perjury if they file wage rates other than those actually paid.

Force Account Work Authorized on Colorado River Aqueduct

Authoriaztion for Frank E. Weymouth, chief engineer and general manager of the Metropolitan Water District of Southern California, to start work at once by force account on construction of 33 miles of tunnels for the Colorado River aqueduct was voted Dec. 21 by the district board of directors. The tunnels will be through Little San Bernardino Mountain, northwest of Coachella Valley. Construction under the force account system was ordered by the board in order that delays in providing employment might be eliminated.

It is estimated that this tunnel work will cost $18,000,000 and take five and a half years to complete, and that 4,000 men will be given work by June, 1933. About half that number of men will be employed very soon, Mr. Weymouth said. The directors have approved plans for handling applications for work through employment offices and agencies already established in the different cities of the district. To be eligible for employment, the applicant must have been a resident of the district for a period of one year immediately prior to Sept. 29, 1931.

Mr. Weymouth informed the board that steps had been taken to advertise for bids on five more contracts for construction work and materials. Bids will be asked for approximately 180 miles of steel pipe for a temporary water supply system; for the installation of 40 miles of temporary water system to serve the Coachella tunnel section; the building of 40 miles of road; construction of 131 miles of power transmission line and the boring of the Valverde and Bernasconi tunnel section of the aqueduct.

Contracts recently were let for construction of the San Jacinto tunnel, the largest on the aqueduct.

Contracts and Capital

CONSTRUCTION

(Thousands of Dollars)

	Weekly Average Dec., 1931	Four Weeks	Week Dec. 29, 1932
Federal government	$3,325	$5,306	$4,863
State and municipal	11,974	11,360	4,865
Total public	$15,299	$16,666	$9,728
Total private	9,727	4,472	4,674
Week's total	$25,026	$21,138	$14,402
Cumulative, Jan. 1 to date:			
1931 construction			$2,432,328
1932			1,219,830

Decrease, 50 per cent.

NEW PRODUCTIVE CAPITAL

(Thousands of Dollars)

	Weekly Average Dec., 1931	Four Weeks	Week Dec. 24, 1932
R.F.C. loans		$2,100	$3,100
New capital issues	$6,000	12,300	9,400
Total	$6,000	$14,400	$12,500
Cumulative, Jan. 1 to date:			
1931 new capital			$2,016,000
1932 R.F.C. loans approved		$145,800	
1932 new capital		794,900	
1932 total			$941,700

Decrease, 53 per cent.

ENR Cost and Volume Index

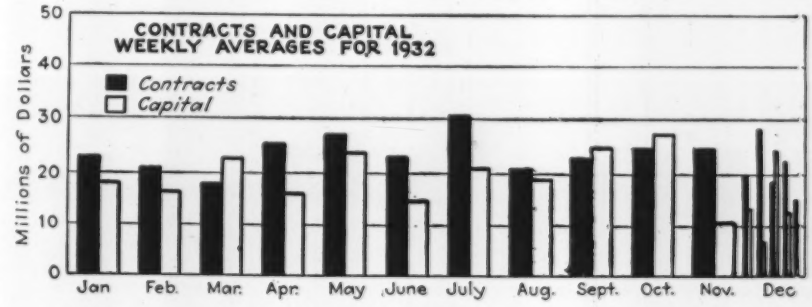
Cost		Volume	
December, 1932	**158.46**	**November, 1932**	**137**
November, 1932	158.20	October, 1932	137
December, 1931	166.23	November, 1931	180
1931 (Average)	181.35	1931 (Average)	220
1930 (Average)	202.85	1930 (Average)	260
1913 Average	100.00		

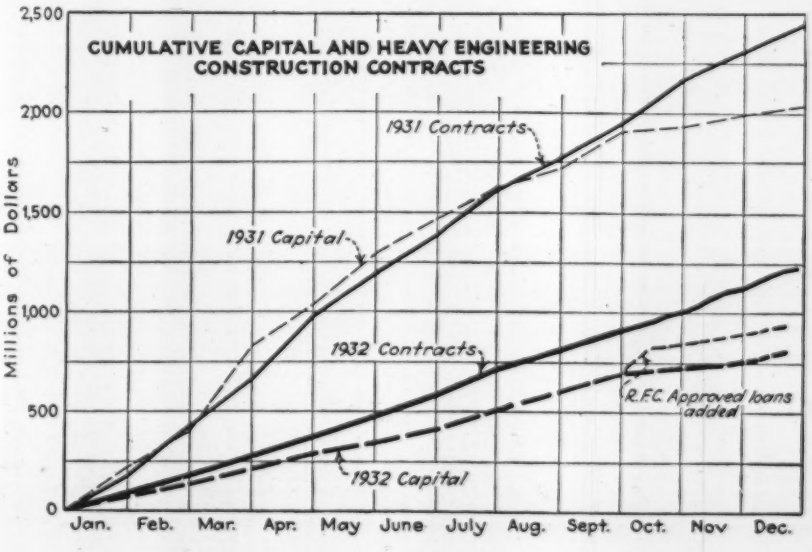
Engineering Contracts and Capital

AN UNUSUALLY low volume in state and municipal awards brought the total of heavy engineering construction contracts reported for the past week down to $14,402,000, the lowest weekly total since September 8. State and municipal contracts amounted to only $4,865,000, the lowest in eight months. Federal awards were about average for the past two months, amounting to $4,863,000. Private contracts totaled $4,674,000, slightly stronger than the average of the past few weeks. Contracts for streets and roads reflected the seasonal low trend, totaling but $3,768,000. The only class of construction to show a gain over the previous week was industrial buildings, which amounted to $3,749,000, as compared with the million-dollar average this class has been showing recently. Among the large contracts reported during the week was a brewery in Brooklyn, $1,500,000; a central heating plant for Washington, D. C., $1,490,000; and Lock and Dam No. 5, Mississippi River, Minnesota, $784,000.

Low bids have been received for San Gabriel Dam No. 1, Los Angeles, $8,600,527; Veterans hospital, San Francisco, $806,000; and highways, New York, $1,228,019. Large projects added to the proposed list include outfall sewers, Los Angeles, $2,700,000; federal office building, Buffalo, $2,000,000; and a water pumping plant, Chicago, $3,000,000.

New productive capital reported for the week totals $12,500,000, including four approved Reconstruction Finance Corp. loans for self-liquidating works of $3,100,000.





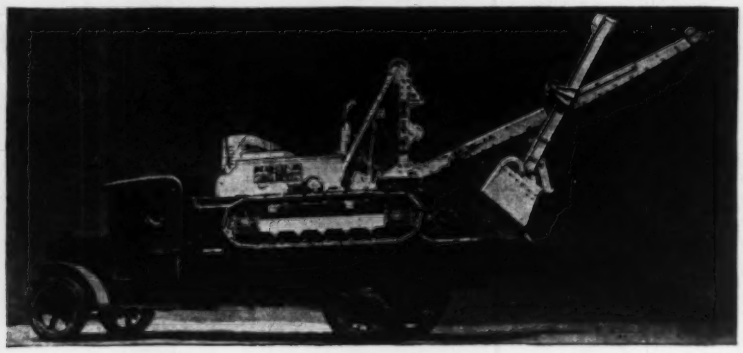
Construction Equipment and Materials

Light Shovel Easily Transported

The Bear Cat, Jr., a new ⅜ yd. convertible shovel, which is light enough to mount and transport on a heavy duty motor truck, is announced by the Bearcat Shovel Works, a division of the Byers Machine Co., Ravenna, Ohio.

The Bear Cat, Jr., weighs 6½ tons complete as a shovel. This light total weight has been attained chiefly by the balance of the machinery which eliminates all dead counterweight, the simple construction and the freedom from crawler mechanism beneath the machinery deck. All operations of traveling, steering from both crawlers, swinging, independent crowding and hoisting are accomplished through only three operating shaft assemblies on the fully enclosed machinery deck. The motor is a four-cylinder slow-speed industrial type, developing 30 hp.

The manufacturer states that the special design and construction features of the machine make it particularly adaptable to road maintenance, loading and unloading operations, basement excavation, gravel and clay bank work, trenching, backfilling and light hook block jobs.

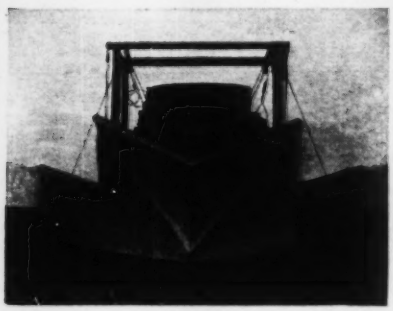


New ⅜-yd. shovel can be transported on a motor truck

Hydraulic Snow Plow

The Linn Manufacturing Corp., Morris, N. Y., has announced a new Sargent hydraulically operated snow plow designed especially for use with the Linn tractor. Three levers lift the V and control the wings and both ends of the wing push arms. Power comes from a hydraulic pump mounted on the power take-off of the tractor. The wings may be kept flat for planing or sloped up for setting back banks. They can also be folded in out of traffic or lifted so high that an automobile can drive under them. There is no piping between the tractor and the plow. The big hydraulic jacks are powerful enough to lift the wings against snow without stopping the tractor, so that the wing man can keep the wing and nose in constant balance when plowing side banks of varying heights.

Sargent snow plow for use with Linn tractors.



Business Notes

A. M. Byers Co., Pittsburgh, Pa., announces the appointment of W. A. Taylor as division manager in charge of the Chicago office. Mr. Taylor, formerly assistant manager, replaces M. G. Henderson who has resigned.

Heisler Locomotive Works, Erie, Pa., announces that Harvey LeFevre, formerly sales manager of the H. K. Porter Co., Pittsburgh, Pa., has joined its forces.

North American Cement Corp., Albany, N. Y., announces the election of John J. Porter as president. Mr. Porter has been vice-president and general manager of this corporation since its organization.

W. H. Scott has been appointed general sales manager of The Duriron Company, Inc., Dayton, Ohio, succeeding T. D. Slingman, Jr., resigned. Mr. Scott has been with The Duriron Company for 13 years, having had charge of the Atlanta Division and later the Philadelphia territory. In 1929 he became sales manager of the Industrial Department and head of the technical department.

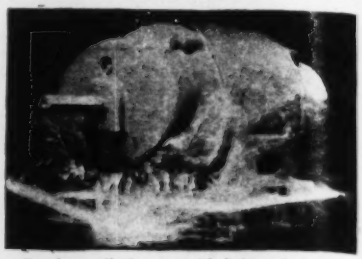
New Publications

Sheet Piling. The Inland Steel Co., Chicago, Ill., has just issued new literature on Inland sheet piling. The circular incorporates the commonly needed engineering data on the Inland sections, tees, corners, crosses and splices as well as other essential information. It is well illustrated and is of convenient size for use on the job or for filing as permanent engineering data.

Tractors. Allis-Chalmers, Milwaukee, Wis., has released a 32-page catalog describing in detail the Allis-Chalmers model "L" track-type tractor. The general plan of the catalog is to cover one outstanding feature of the tractor on each page by means of a large illustration and brief copy. Emphasis is placed on the simplicity of unit construction of the tractor which consists basically of three compact sections, engine, transmission and tracks. The tractor has a six-cylinder engine. It has six forward speeds, ranging from 1.94 to 6.47 miles per hour. It weighs 21,600 pounds.

Splash-Proof Electric Motor

A splash-proof motor designed to prevent entrance of water splashed from any angle, has been perfected by the Louis Allis Co., Milwaukee, Wis. The motor is adequately ventilated and built in the same dimensions as standard open motors. Protection against the entrance of water is provided by a double-baffle in an elliptical-shaped air passage in each end bell. This construction, while permitting free passage of ventilating air, traps and drains water splashed into the air openings at the bottom of the elliptical-shaped chambers. There is also a shaft guard which breaks the force of a stream directed along the shaft extension and prevents water from entering the bearing chamber.



Good ventilation provided in splash-proof motor.

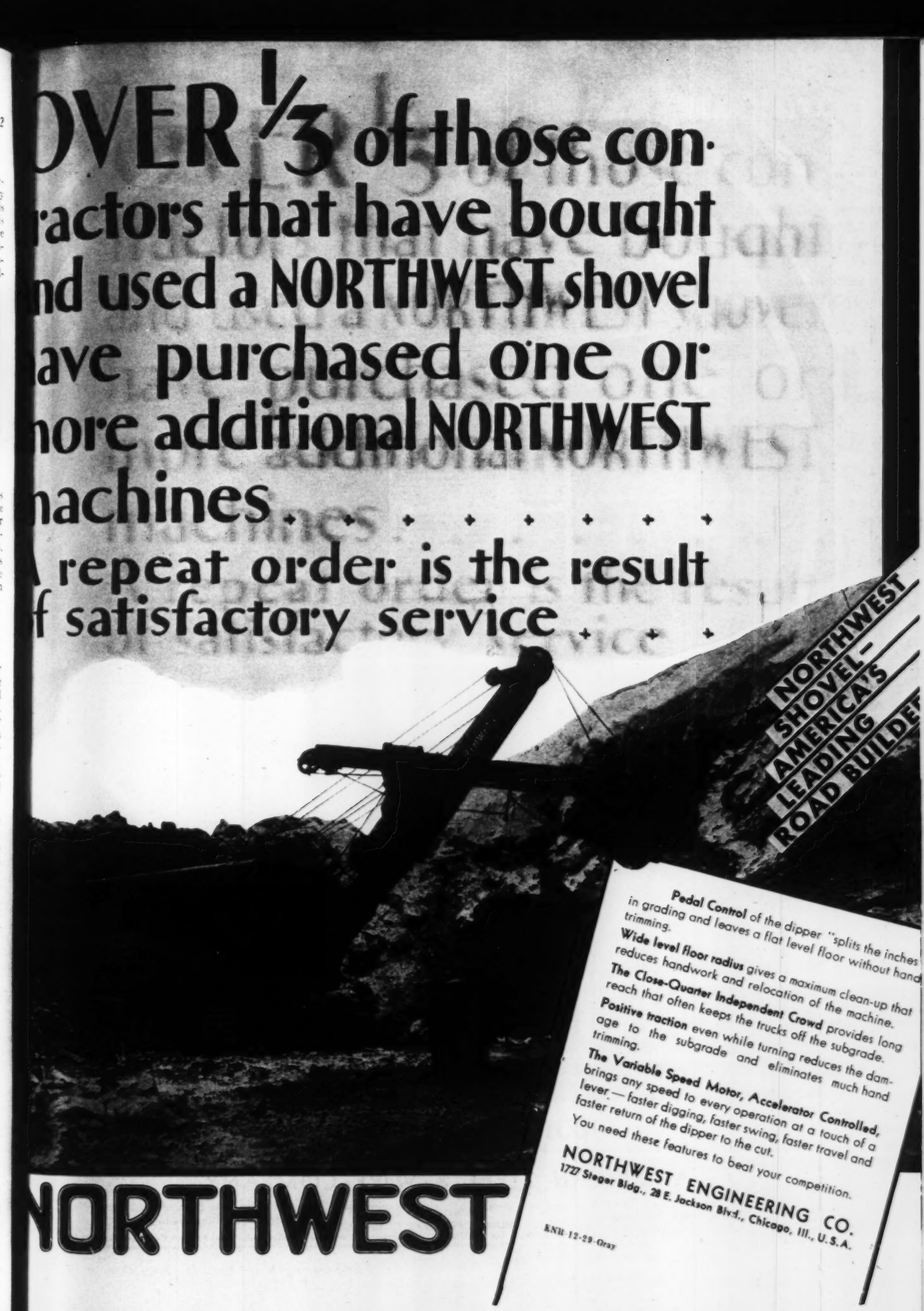
New Equipment in Brief

Tracing Paper. A new tracing paper known as "Cassvell" is announced by the Technical Paper Division of the National Consumers Paper Corp., New York, N. Y. A mineral oil is used to treat the paper in its manufacture and it is said to have a high transparency and good erasing quality. No tracing cloth pounce is necessary in working on it. The manufacturer states that it will not become brittle or discolored with age.

Truck Mixer. A truck mixer with side discharge, especially adapted to highway widening and curb and gutter work, has been announced by the Jaeger Machine Co., Columbus, Ohio. The manufacturer states that the side discharge mounting increases the distance from the truck center line at which concrete can readily be discharged and further permits the use of the truck mixer and trailer mixer longitudinally of the work being poured, thus eliminating the delay of backing and turning the truck. The mixer is built in 2½ and 5 cu.yd. capacities and it will discharge a batch in less than one minute.

Nickel-Clad Steel. Nickel-clad steel is a hot-rolled bi-metal made up of a light layer of pure, solid nickel bonded to a heavy layer of flange quality steel. It is a joint development of the International Nickel Company and Lukens Steel Company, and is produced in the latter company's mills at Coatesville, Pa. The nickel layer can be of variable thickness as desired up to 20 per cent of the total plate thickness. It provides the corrosion-resistance and other advantages of nickel construction. The material is available in the regular hot-rolled finish, carrying a tightly adherent nickel oxide film, and in a new finish classified as "hot-rolled and cleaned," giving the nickel a matt appearance nearly white in color.

OVER 1/3 of those con-
ractors that have bought
nd used a NORTHWEST shovel
ave purchased one or
nore additional NORTHWEST
nachines . . . . . .
repeat order is the result
f satisfactory service . . .



Pedal Control of the dipper "splits the inches" in grading and leaves a flat level floor without hand trimming.

Wide level floor radius gives a maximum clean-up that reduces handwork and relocation of the machine.

The Close-Quarter Independent Crowd provides long reach that often keeps the trucks off the subgrade.

Positive traction even while turning reduces the damage to the subgrade and eliminates much hand trimming.

The Variable Speed Motor, Accelerator Controlled, brings any speed to every operation at a touch of a lever.—faster digging, faster swing, faster travel and faster return of the dipper to the cut.

You need these features to beat your competition.

NORTHWEST ENGINEERING CO.
1777 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., U.S.A.

ENR 12-29-Gray

NORTHWEST

AMERICAN STEEL & WIRE COMPANY

WIRE FABRIC

THE STEEL BACKBONE OF CONCRETE

Building for the Future

Road engineers have found in American Steel & Wire Company Wire Fabric the ideal steel reinforcement for concrete. No other form of reinforcing material possesses the same amount of binding or holding power.

When embedded in a highway, Wire Fabric acts as a steel backbone for the concrete—provides greater tensile strength, and prevents the opening of fine hair cracks which may form in the setting.

Wire Fabric is furnished in road size sheets, according to specifications. Let us send you complete information.

1831 1932

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

AND ALL PRINCIPAL CITIES

Empire State Bldg., New York
First National Bank Bldg., Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York

3-WAY BRIDGE BUILDING

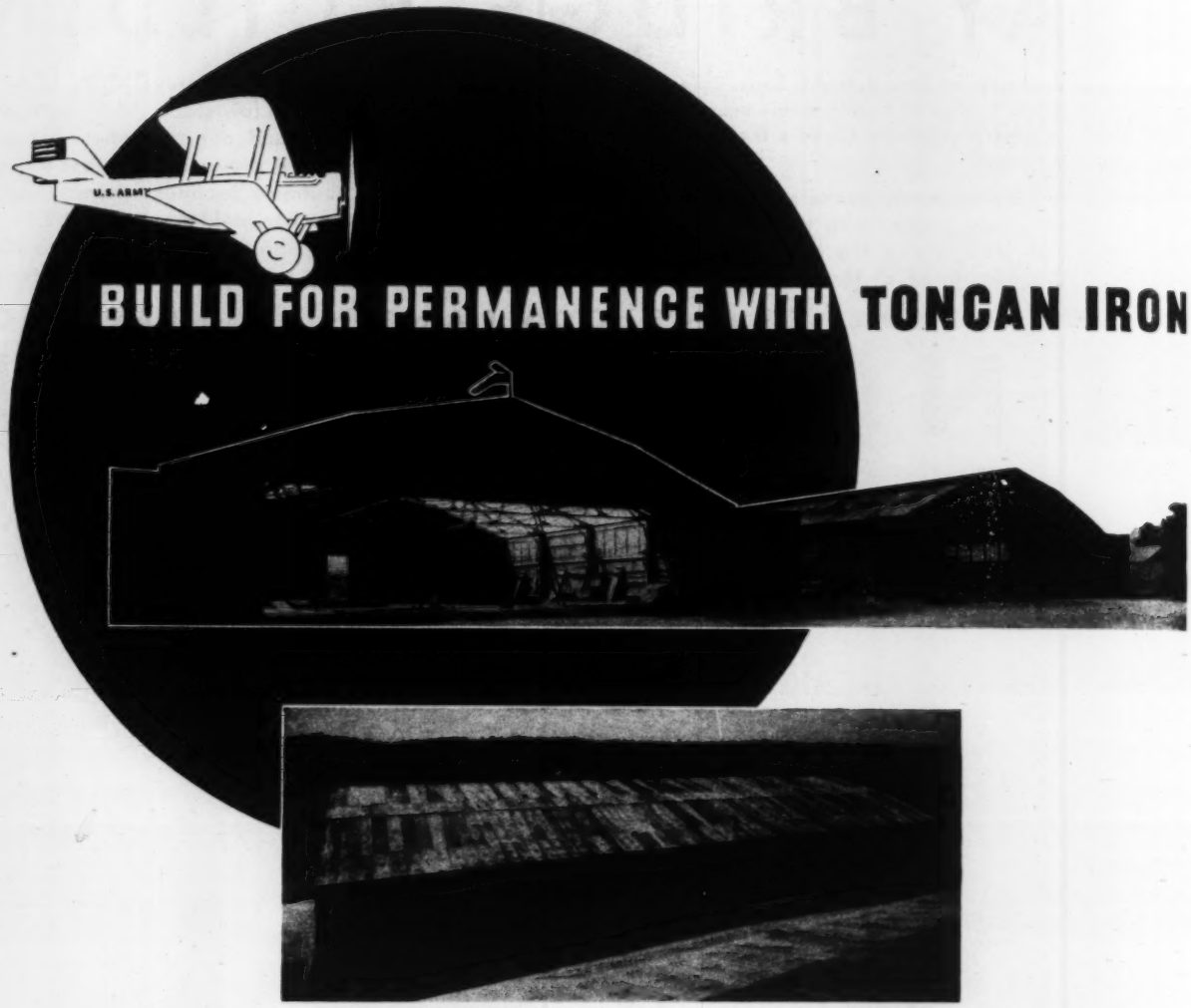
1 Here's how a Universal of Geo. J. Igel & Sons, Columbus, Ohio, figured in all 3 steps of building this bridge. First, it drove the piling and placed the timbers for the detour bridge shown to the right.

2 Next, it erected the falsework in the center, driving all the piles, and covering them with the flooring of the old bridge. This falsework carried the crane as it handled all the steel in the demolition of the abandoned bridge.

3 From this falsework it also drove 20 ft. sheet piling for a 40′ x 16′ cofferdam (pictured). Then, with a bucket, it made channel changes and dug the abutment excavation. Changing to pile driver it drove 20 ft. timber piling, through 10 ft. of water, for abutment footings; thence back to bucket for borrow pit excavation to build the approach fills. Such thorough adaptability to all phases of a job applies to other Universal uses as well. Bul. 36 tells about them. Write for your copy.

THE UNIVERSAL CRANE COMPANY • • LORAIN, OHIO

•UNIVERSAL•



BUILD FOR PERMANENCE WITH TONCAN IRON

Several years ago two hangars, each 140 feet long and 60 feet wide, were erected at Watson Airport, near Cincinnati, Ohio, for use by the United States Army Air Force. Later they were moved to their permanent location at Lunken Airport, Cincinnati, one of the finest flying fields in the country.

At this time it was decided that they should be equipped with permanent roofs for protection against lightning and the fierce storms which sweep the Ohio valley. The work was done by the Edward Meyer Roofing Company, Cincinnati, and the material selected was Toncan Iron.

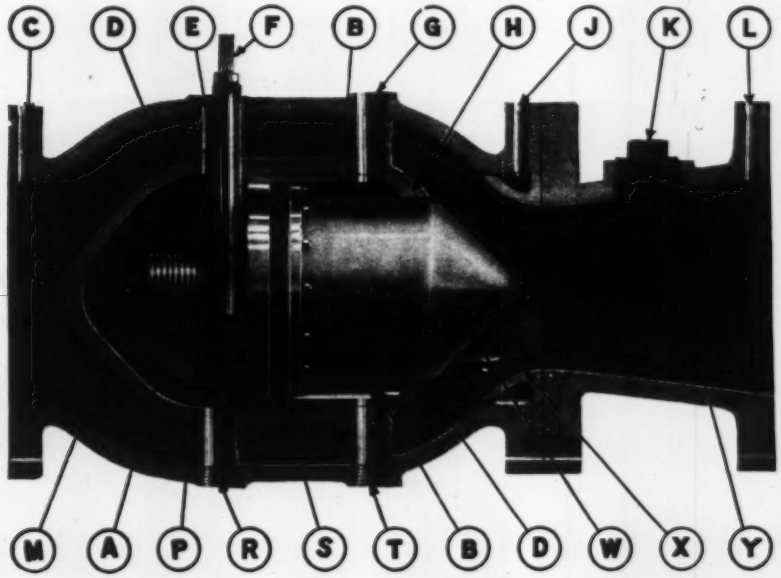
Toncan Iron, an alloy of refined iron, copper and molybdenum, ranks first among the ferrous metals after stainless steel in its resistance to rust. It resists the devastating action of time and the elements, and brings a degree of permanence in building construction far greater than its slightly higher cost would seem to indicate.

Engineers and contractors interested in obtaining longer life from ferrous metals should read "The Path to Permanence." Copy will be sent upon request.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

TONCAN COPPER MOLYBDENUM IRON



THIS BALANCED PLUNGER PRINCIPLE *makes these water works valves superior*

A—Pressure chamber for closing valve.

B—Pressure chamber for opening valve.

C—Connection to pipeline pressure.

D—Supporting rib for stationary operating cylinder.

E—Inlet to chamber A.

F—Spindle for valve opening indicator and control.

G—Inlet to chamber B.

H—Guide for plunger travel.

J—Discharge connection for pressure regulator.

K—Inspection hole and plug.

L—Connection to pipeline pressure.

M—Stationary internal cylinder.

P—Rack for operating position indicator F.

R—Drain for chamber A.

S—Water seal packing for plunger.

T—Drain for chamber B.

W—Main plunger or needle.

X—Plunger seat (integral with H).

Y—Taper pipe connection.

As the heart of check valves, altitude valves, pressure regulators and surge suppressors—modern Baldwin-Southwark valve offerings for improved water works service—this Larner-Johnson balanced plunger design assures quiet and steady operation, the elimination of vibration and chattering, the elimination of turbulence, the reduction of head losses, and a precision of control that cannot be attained in units of other types.

In brief, the principle of operation is simple. Plunger W is moved and controlled by a pressure differential between operating chambers A and B. The control, mounted externally on the valve body, may be made sensitive to upstream pressure, downstream pressure, rate of flow, or other hydraulic or electrical conditions.

One example of the superior valve engineering typical of Southwark.

Engineers of this company have been continuously engaged in the solution of hydraulic problems for a period of nearly fifty years.

During this interval, practically every type and size of hydraulic valve has been designed, built and installed for conditions incident to development of power with water and the movement of water with power. Such an invaluable experience forms a background for the valve engineering and service now offered by Southwark to the water works industry.

Look to Southwark for the best in modern valve design.

BALDWIN-SOUTHWARK CORP.
SOUTHWARK DIVISION
PHILADELPHIA

Pacific Coast Rep.: The Pelton Water Wheel Co., San Francisco

SOUTHWARK

WHITE TRAFFIC MARKERS *That STAY White* FOR YEARS

White concrete traffic markers installed in new concrete pavement on Ventura Boulevard, Los Angeles, by California Division of Highways. Kovacevich & Price, Los Angeles, contractors. Atlas White portland cement used.

"THE inlaid white-cement traffic line thus has come decisively into the range of construction expedients directed toward reducing maintenance costs." This is the conclusion of an editorial in *Engineering News-Record* for November 10, 1932.

To that statement of fact may be added other facts:

White concrete traffic markers as made with Atlas White portland cement are easy to install in any type of pavement. The methods are simple.

White concrete traffic markers made with Atlas White are inexpensive. The first cost is low.

Traffic markers made with Atlas White are economical. As they require no replacement, the first cost is the last.

Atlas White traffic markers are permanent. They last for years.

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CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Friant—State Fish & Game Comn., 1,675 g.p.m. pumping plant, 600 lin.ft. concrete pipe, in connection with fish culture project near here. Work starts about Mar. 1.

Calif., Winters—City to have plans made for 100,000 gal. steel water tank.

Colo., Breckenridge—City plans reconstructing water system. $20,000. Plans making application for loan to Reconstruction Finance Corp.

Conn., Wallingford — Borough, Water Dpt., preparing plans extensions and improvements to water supply distribution system, incl. 3,200 ft. large water pipe. To exceed $15,000. W. A. MacKenzie, Water Dpt., engr.

Ill., Chicago—City Central Pumping Station to replace 3 obsolete ones and mains to connect the new station with city's water district system. Material incl. 5,000 ft. c.i. pipe, six 50,000,000 gal. capacity electric operated centrifugal pumps and chlorinating equipment required est. $1,000,000. Reconstruction Finance Corp. Loan approved $3,000,000.

Ill., Mount Carmel—Voters approved proposition to borrow $100,000 from Reconstruction Finance Corp. for construction new waterworks plant and extensions to distribution system. Caldwell Eng. Co., Jacksonville, engrs. Noted Dec. 22.

La., Gretna—Council plans waterworks. $200,000. Plans application to Reconstruction Finance Corp. for loan.

La., West Monroe — City, drilling artesian well and laying 2,000 ft. 10 in. c.i. watermains, with city forces. Reconstruction Finance Corp. recently approved loan.

Mich., Dearborn—City retained Hubbell, Hartgering & Roth, consult. engrs., 2640 Buhl Bldg., Detroit, to prepare estimates and preliminary plans for independent water system for city, following survey as to location for intake, incl. filtration plant and distribution to existing water mains now supplied by city of Detroit.

Minn., Faribault—City soon takes bids 2 m. g. rein.-con. reservoir $30,000. I. Smith, city engr. W. S. Hewett, 5605 Stevens Ave., Minneapolis, consult. engr.

N. J., Deal—Bd. Boro Comrs., Boro Hall, preliminary plans municipal water plant, electrically operated, $100,000. Remington, Vosburgh & Goff, 509 Cooper St., Camden, engrs. Noted Dec. 8.

N. Y., Pelham—Bd. Village Trustees, election Jan. 1, $175,000, water distribution system. Noted Jan. 1.

Pa., Shippensburg—City retained Gannett, Seelye & Fleming, Engineers, Inc., 600 North 2nd St., Harrisburg, and 19 Rector St., New York, to investigate and report on new gravity water supply for city waterworks, which will ultimately cost several hundred thousand dollars.

Wash., Seattle—Comrs. King Co. soon take bids pipe line on 205th St. from Fremont to Woodland Park Ave. to connect with North End Water extension. $350,000. Franchise is now being sought from State to build $35,000 pipe line from end of line authorized to Alderwood Manor.

BIDS ASKED

Colo., Denver—Jan. 10, by City and Denver Co., steel conduit in Moffat Tunnel, ditches, etc., involving 15,860 ft. steel pipe welded, 7 ft. diameter in 4 sections, 4,000 ft. each for 3 sections ⅜ or 9/16 or ½ in. thickness, 3,860 ft. for one section 7/16 in., 400 ft tunnel, 200 ft. intake well, canal and enlarging parts of tunnel from 6 ft. diameter to take conduit. $1,000,000. D. D. Gross, Denver, engr.

Mass., Melrose—See "Contracts Awarded."

†Nev., Nixon—Jan 6, by U. S. Indian Bureau, at Pyramid Lake Indian Sanatorium, 15,000 gal. redwood water tank, incl. 60 ft. steel tower.

CONTRACTS AWARDED

D. C., Wash.—District Comrs., District Bldg., 48 in. watermain from 5th and Upshaw Sts. to Illinois Ave. to Georgia Ave. and to Military Rd., to P. and A. J. Ellis, Inc., Wyoming Ave., Phila., Pa., $95,646.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Calif., Los Angeles—Los Angeles Co. plans 8 mi. outfall sewer extending from Harbor City to White Point, thence 5,000 ft. into ocean in County Sanitation Dist. 2, involving 38,800 ft. tunnel through Palos Verdes Hills. $2,700,000. A. K. Warren, 139 North Bway., engr.

Ind., Evansville—Bd. P. Wks. adopted resolution to construct Delhaven Sewer. $27,749.

Minn., Redwood Falls—City plans new sewage disposal plant. $25,000 (not official). Council has had surveys made. New agitation due in 1933. F. H. Anthony, city engr.

O., Cleveland—City plans completed sanitary sewer in Sects. 8, 9, 10, 11 and 12 of Big Creek Intercepting Sewer. $125,000; also preparing plans sanitary sewer in Valley Rd. and West 15th St. leading into Big Creek Intercepting Sewer. $35,000. R. Hoffmann, city engr.

Utah, Provo—See "Public."

BIDS ASKED

D. C., Wash.—Jan. 4, by District Comrs., District Bldg., sewers.

Ky., Bowling Green—Jan. 5, by City Clerk, (1st unit) sanitary sewage system, Dist. 1-A-1, involving 48,000 lin.ft. 8 in. and 85,000 lin.ft. 6 in. terra cotta sewers. Est. $85,000. J. N. Chester Engineers, Clark Bldg., Pittsburgh, Pa., engrs. Noted July 7.

N. Y., Brooklyn—Jan. 6, by H. Hesterberg, pres. Brooklyn Boro., Boro. Hall, sewers Delamere Pl., Village Rd., Gravesend Ave., Avenue S, 86th, Lake, Van Sicien, West 5th, West 6th and Batchelder Sts.

N. C., Winston-Salem — See "Materials and Equipment."

CONTRACTS AWARDED

Mass., Brookline—Woodland Road Development Co., c/o H. F. Bryant & Son, engrs., 334 Washington St., 8 in. and up vitr. clay sewers and bituminous macadam paving ½ mi. roadway, to M. McDonough Co., Bway., Saugus, $12,569.

Mass., Newton—City, Water Dpt., installing steam and water lines in new pump house (now under construction), Newton Upper Falls, from Jennison Co., 17 Putnam St., Fitchburg, $8,692. Noted Sept. 8.

N. J., Marlboro—Institutions & Agencies, State Office Bldg., Trenton, sewage disposal plant at New Jersey State Hospital, to Thomas Proctor Co., 218 5th Ave., Long Branch, $37,500. Former contract rejected. Noted Oct. 6, under "Contracts Awarded."

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Colo., Pueblo—Bd. Comrs. Pueblo Co., appropriated $133,000 for bridge and road improvements in 1933. C. A. Reese, co. engr.

Colo., Westcliffe—Comrs. Custer Co., W. A. Walker, clk., appropriated $38,000, for bridge and road work for 1933.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, A. W. Dean, engr., making plans bridge over Fore River, between Quincy and Weymouth, $2,500,000. Awaiting action of State Legislature. F. E. Lyman, comr., State House, Boston. Noted Dec. 24, 1931.

Massachusetts — Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, plans 6 bridges and hy. from Cambridge through Arlington, Belmont, Lexington, Lincoln to Concord, incl. 2 bridges over Boston & Maine R.R., 2 over Sudbury River and 2 over Assabet River. F. E. Lyman, State House, comr.

Mass., Hinsdale—Town, J. B. McMaster, chn. Bd. Selectmen, and Commonwealth of Massachusetts, plans structural steel bridge, concrete founds. To exceed $25,000. **Maturity 1933.** F. E. Lyman, Dpt. P. Wks., State House, comr.

Mo., St. Louis — H. C. Brenner Realty & Finance Co., c/o H. C. Brenner, 2801 Chippewa St., will not construct rein.-con., steel bridge over Mississippi River between Osage and Cherokee Sts. $5,000,000. Congress killed bill for extending time for construction and completion of bridge. Noted Feb. 26, 1931.

N. Y., Clifton Park—Boston & Maine R.R. Co., W. J. Backes, ch. engr., Boston, Mass., and Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, soon take bids eliminating Hubbs and Dyers Crossings. $30,000. Plans approved by Pub. Serv. Comn. Noted Dec. 24, 1931.

N. Y., Owego — Delaware, Lackawanna & Western R.R. Co., G. J. Ray, ch. engr., Hoboken, N. J., soon takes bids general contract change in existing structure. Pub. Serv. Comn. approved contract forms, specifications, etc.

Texas—State Hy. Comn., W. R. Ely, chn., Austin, preparing plans rein.-con. bridge over Brady Creek, Hy. 9, McCulloch Co.***steel, concrete bridge over Colorado River, Hy. 16, Coleman Co.***rein.-con. bridge over Anderson Creek, Hy. 1, Bowie Co.***rein.-con. bridge over Mountain Creek, Hy. 1, Dallas Co.***steel, concrete bridge over North Llano River, Hy. 27, Kimble Co.***2 rein.-con. bridges over Buck and Sandy Creeks, Hy. 89, Palo Pinto Co. G. G. Wickline, Austin, bridge engr.

Texas—State Hy. Comn., c/o W. R. Ely, chn., Austin, plans underpass under Texas & Pacific R.R., Hy. 5, near Bonham, Fannin Co.; steel, concrete overpass over Missouri, Kansas & Texas Ry. Co. tracks, Hy. 31, McLennan Co. C. G. Wickline, Austin, bridge engr.

BIDS ASKED

California—Jan. 4 by State Hy. Comn., Sacramento, bridge over Mojave River at Barstow, consisting of five 100 ft. deck plate girder span seven 35 ft. steel stringer spans, grading, oil treated crushed gravel or stone surfacing approaches, San Bernardino Co.

Calif., Barstow—Jan. 4, at office C. H. Purcell, state hy. engr., Sacramento, five 100 ft. deck plate girder and seven 35 ft. steel stringer span bridge over Mojave River at Barstow, San Bernardino Co.

Calif., Los Angeles—Jan. 3 by Supervs. Los Angeles Co., 98 ft. steel and timber bridge over Coyote Creek, Valley View St.

Michigan—Jan. 5 by H. G. Oakes, division engr., Plymouth, Fltr. 1 of 12-7-2, Contr. 2 and 3, one 75 ft. span, 2 rein.-con. cellular type rein.-con. abutments, steel deck girder, Branch Co., for State Hy. Comn., Lansing.

Minn., Grand Rapids—Jan. 10, by T. Erskine, aud. Itasca Co., Swan Lake Bridge; 100 ft. steel span***Long Lake Bridge, 45 ft. steel span*** Streetcar Bridge, 60 ft. steel span***Shafer Bridge, 300 ft. long, timber. H. A. LeSueur, Grand Rapids, co. hy. engr.

Wash., Bellingham—Whatcom Co. taking bids repairing bridges, 3 wing dams and dikes, $15,000 appropriated. C. McCoy, Bellingham, engr.

CONTRACTS AWARDED

Calif., Bakersfield—E. E. Wallace, dist. engr., State Hy. Comn., Fresno, bridge over Walker Creek, 13 mi. east of here, to have thirteen 19 ft. timber stringer spans on creosoted pile bents and bridge over Caliente Creek, 15 mi. east of here to have eleven 19 ft. timber stringer spans on creosoted bents to C. Ingalls, P. O. Box 1593, Bakersfield, $11,767 and $10,822 respectively.

Minnesota—State Hy. Dpt., St. Paul, constructing Bridge 5239, at Rushford, and Bridge 5257, 2 mi. north of Rushford, Fillmore Co., to A. Guthrie & Co., Builders Exch. Bldg., St. Paul, $31,468 and $18,671, respectively, less 3%. Noted Dec. 1.

Montana—State Hy. Comn., Helena, to A. R. Elliott, Charlo, constructing 5 bridges, Lake Co. $9,662***to Rue Bros., Bismarck, N. D., 6 bridges, McCone and Dawson Counties $36,434 ***to McLaughlin Constr. Co., Livingston, 6 timber bridges, Petroleum and Garfield Counties $15,861; 5 timber stock passes, Golden Valley Co. $18,199; rein.-con. bridge, Madison Co. $7,044***to Morris Constr. Co., Great Falls, bridge, Pondera Co. $7,252***to McGeever & Stamsos, Butte, bridge, Lewis and Clark Co. $10,085***to Prahl & Sawtell, Miles City, 13 treated timber bridges, Treasure Co. $17,815. Grand total $122,352. Noted Dec. 8, under "Streets and Roads."

Nevada—State Hy. Dpt., Carson City, constructing bridge over Meadow Valley Wash, near Caliente, Lincoln Co., to A. O. Thorn, Strong & Grant, Springville, Utah, $15,807. Noted Dec. 8.

New Jersey—State Hy. Comn., Trenton, viaduct on Route 21, Sect. 1A, Newark, Essex Co. to J. F. Chapman & Son, Inc. and J. F.

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Federal Government projects are classified under heading denoting type of work and designated by symbol†

◆

Bridges, etc. (Continued

Chapman & Co., Hillside, $498,425 and bridge over Paulin's Kill, Route 8, Sect. 4, Warren Co. to Salmon Bros., Netcong, $42,724. Noted Nov. 3.

N. Y., Irwin—Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bank Bldg., Cleveland, O., eliminating Patterson Grade Crossing, to I. M. Ludington's Sons, c/o owner, $43,995.

Oregon—State Hy. Comn., Portland, bridge at Long Creek Gulch, Grant Co., to K. H. John, Portland, $16,118***bridge, Odell Lake section Willamette Hy., Klamath Co., to Starr & McCall, Klamath Falls, $16,813***raising, widening bridge at New Aurora, Marion Co., to J. Johnson, Portland, $5,064. Grand total $37,995. Noted Dec. 8.

Tennessee—See "Streets and Roads."

B. C., Vancouver—Burrard Inlet Tunnel and Bridge Co., c/o E. H. Bridgman, 8th and Southerland Sts., repairing Second Narrows Bridge, to Dominion Bridge Co., Ltd., 275 West 1st St., $840,000.

STREETS AND ROADS

BIDS ASKED

California—Jan. 4, at office C. H. Purcell, state hy. engr., Sacramento, grading, concrete paving 5 mi. hy. between points 6 mi. and 1 mi. south of San Ardo, Monterey Co.***grading, asphaltic concrete paving 4.1 mi. hy. between Las Flores Canyon and Santa Ynez Canyon, Los Angeles Co.

†**California**—Jan. 12, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 7.507 mi. Unit C-2, Calif. Federal Lands Project 1, Hoopa Valley Indian Reservation, Humboldt Co.

Calif., Santa Rosa—G. P. Sanborn, clk., Sonoma Co., rejected bids Dec. 13, improving Duncan Mills to Jenner Hy., Sect. B, involving 25,000 cu.yd. roadway excav., 16.6 MFBM redwood lumber, 840 lin.ft. redwood piles, 450 lbs. structural steel, 18 cu.yd. "A" concrete, 854 lb. reinforcing steel. A. E. Peugh, Santa Rosa, co. engr. Noted Dec. 6 Daily.

Colo., Pueblo—See "Contracts Awarded."

Kansas—Jan. 13 by State Hy. Comn., Parsons, chat surfacing 6.08 mi. Project 39-10-FA 271-D, Bourbon Co. W. V. Buck, Topeka, engr.

Nevada—Jan. 4 (extended date), by S. C. Durkee, state hy. engr., Carson City, concrete paving 1.23 mi. highway, Loclock, Pershing Co.; and 4.13 mi. road, Las Vegas, Clark Co., for State Hy. Dpt., Carson City. Noted Dec. 8.

N. Y., Brooklyn—Jan. 6, by H. Hesterberg, pres. Brooklyn Boro., Boro. Hall, grading, curbing, flagging Delamere Pl., Sheffield and Voorhees Aves., East 64th and East 92nd Sts.; grading, asphalt paving Ditmas Ave.

New York—Jan. 10, by A. W. Brandt, comr. Hys., Albany, reconstructing roads in Ulster, Washington and Westchester Counties.

Wash., Seattle—King Co. bids about Jan. 13, concrete paving 1 mi. East-West Hy., Des Moines Hy. to State Rd. 1. $20,000. T. D. Hunt, Seattle, co. engr.

Wis., Marshfield—See "Contracts Awarded."

CONTRACTS AWARDED

California—At office C. H. Purcell, state hy. engr., Sacramento, grading, asphaltic concrete paving 8.9 mi. hy. between south boundary and Corning, Tehama Co., to Hanrahan Co., 582 Market St., San Francisco, $129,806. Noted Dec. 1.

California—At office C. H. Purcell, state hy. engr., Sacramento, grading, concrete paving 0.6 mi. hy. between Merced and Merced Airport, Merced Co., to C. W. Wood, P. O. Box, 1435, Stockton, $28,410. Noted Dec. 1.

†**Calif., Alameda**—Con. Q.M., Benton Field, replacing rock fill for roads and paved area involving 13,500 cu.yd. to J. Catucci, 1212 18th Ave., Oakland, $9,437.

Colo., Pueblo—City Council, G. W. Clark, clk., reducing grade of 29th St. hill, day labor, $25,000. D. P. Gaymon, city engr. All hand labor and Reconstruction Finance Corp. project.

Indiana—State Hy. Comn., Indianapolis, grading, concrete paving 80,544 sq.yd. road in Warrick and Spencer Counties, to Louis Des Cognets & Co., Evansville, $122,061, est. $135,018*** 113,950 sq.yd. Miami Co. to Frisinger Constr. Co., Ann Arbor, Mich., $124,965, est. $167,402 ***129,286 sq.yd. Tippecanoe Co. to Moellering Constr. Co., Fort Wayne, $146,541, est. $206,621. Grand total $393,567. Noted Nov. 10.

Iowa—State Hy. Comn., Ames, grading 11.592 mi. Polk and Jasper Counties, to G. Osterman Ocheyedan, $58,885***graveling 5.6 mi. F.A. 354 and 13.5 mi. F.A. 778, Decatur Co., to Sargent Bros., Des Moines, $11,050 and $8,762 respectively * * * four I-beam bridges, FAB 376, Polk and Jasper Counties, to Snyder & Johnson, Humboldt, $25,286; * * * 15 concrete pipe culverts, to Christensen Bros., Tyler, Minn., $17,990. Grand total $121,953. Noted Dec. 15.

Louisiana—State Hy. Comn., Baton Rouge, clearing, embankment, stripping, 3.3 mi. Rigolets-Pearlington (Miss.) Hy., Tammany Parish to

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McWilliams Dredging Co., Canal Bank Bldg., New Orleans, $610,140. Noted Dec. 15.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, F. E. Lyman, comr., bituminous macadam paving 27,907 ft. State Hy. Maintenance Project, Middleborough, to Arute Bros., Inc., Box G, Bridgewater, $54,452.

Montana—State Hy. Comn., Helena, grading 18.163 mi. McCone and Dawson Counties, to Haas Contg. Co., Minot, N. D., $87,600***16.126 mi. Golden Valley Co., to Tomlinson Arkwright Constr. Co., Great Falls, $100,389***graveling 7.088 mi. Mullan Rd., Granite Co., to Powell & Helean, Missoula, $125,932****20.062 mi. Madison Ave. and 11.032 mi. Treasure Co., to L. T. Lawler, Butte, $94,885 and $89,456 respectively ***20.29 mi. Madison Co., to J. L. McLaughlin, Great Falls, $57,486. Grand total $555,748. Noted Dec. 8.

N. J., Atlantic Highlands—Bd. Freeholders Monmouth Co., Court House, Freehold, grading, 9 in. rein.-con. paving New Road Rt. 36, to Riverside Concrete Co., Riverside, $331,393. Noted Nov. 24.

Oregon—State Hy. Comn., Portland, clearing, grubbing, grading 5.55 mi. Little Butte Sect. Secondary Hy., Jackson Co., to Vonder Hellen & Pierson, Medford, $15,267***concrete paving 2.1 mi. Pacific Hy., Clackamas Co., to West Contract Co., Portland, $46,595***grading 0.3 mi. Secondary Hy., Coos Co., to M. L. O'Neil & Co., Eugene, $2,752***6.37 mi. Drinkwater Pass-Chimney Creek Sect. Central Oregon Hy., to General Constr. Co., Colman Bldg., Seattle, Wash., $98,621. Grand total $163,135. Noted Dec. 8.

Tennessee—State Hy. Comn., Nashville, grading, drainage 10.1 mi. hy. between Waverly and Houston Co. line, Humphries Co., to J. Oman, Jr., Acklen Park, Nashville, $72,863*** paving 8.3 mi. Rd. 1, Davidson Co., to Municipal Paving & Constr. Co., Cotton States Bldg., Nashville, $140,693***12.3 mi. Hy. 76, between Bells and Humboldt, Crockett and Gibson Counties, to J. J. Higgison & Co., 701 McFarland Ave., Chattanooga, $227,767***grading, drainage structures 2.2 mi. hy. between Trenton and Milan, Gibson Co., to McDade & McDade, Fulton, Ky., $54,640***7 bridges on Hy. 17, Humphrey Co., to Garrett Bros., Camp Hill, Ala., $78,621. Grand total $574,584.

†**Tex., Fort Sam Houston**—Con. Q.M., paving surrounding buildings to Southwest Bitulithic Co., 302 Castro St., San Antonio, $88,940.

Wash., Montesano—Grays Harbor Co., constructing 1.25 mi. Sickman-Ford-Garrard Creek Hy., and overhead crossing over Oregon-Washington tracks, to A. Del Guzzo, 5702 Idaho St., Seattle, $12,487 and $3,858, respectively***constructing 0.25 mi. Preacher Slough Rd., to W. Robertson, Montesano, $3,237. Grand total, $19,582.

Wis., Marshfield—City, E. E. Forseth, clk., concrete paving West Arnold, West Vine and West 2nd Sts., day labor, $90,000. Bids for materials after Jan. 1. Thomsen-Abbot Co., Marshfield, engrs.

†**Wyoming and Montana**—Pub. Rds., Portland, grading, draining 17.225 mi. Red Lodge-Cook City Approaches, Natl. Park Rd., in Yellowstone Natl. Park, Park Co., to Winston Bros., 1464 North West Bank Bldg., Minneapolis, Minn., $161,473.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Auburn—North Fork Ditch Co., c/o J. W. Gross, Engr., Forum Bldg., Sacramento, irrigating 7,020 acres and domestic purposes, present canal capacity will be increased, $50,000. Work starts about Feb. 1.

Calif., Lincoln—C. A. Gladding, Lincoln, plans irrigating 750 acres, involving 1,600 g.p.m. pumping plant. Work starts about Feb. 1.

Calif., San Luis Obispo—O. Thompson, Security 1st Natl. Bank, Los Angeles, plans irrigating 77 acres, involving 600 g.p.m. pumping plant, 7,400 lin.ft. 10 in. concrete pipe. Work starts Feb. 1.

Colo., Durango—La Platte River Water Users Assn., E. F. Taylor, pres., plans 90 ft. earth dam for Reservoir No. 1, La Platte River, $300,000. Plans application to Reconstruction Finance Corp. for loan.

Colo., Trinidad—Model Irrigation Dist. plans dam and reservoir, Ling's Canyon, $300,000. Plans application to Reconstruction Finance Corp. for loan.

†**Florida**—U. S. Eng., Fort Barrancas, appropriations for 1933 maintenance and improving Pensacola Harbor $82,000; Appalachicola Bay $23,000; Upper Chipola River $10,000; St. Andrews Bay $30,000; Choctawhatchee River $11,000; constructing Pensacola-Mobile Canal $20,000. Mayor R. A. Sharrer, Dist. Engr., Montgomery, Ala. H. P. Merrill, Engr. (Civil), Ft. Barrancas.

†**Mich., Alpena** — U. S. Eng., Old Custom House, plans improving harbor and channel, incl. dredging channel 200 ft. wide, 21 ft. deep, to extend from existing federal channel to 21 ft. contour in Thunder Bay Harbor; also deepening existing channel to 18.5 ft. and dredge turning basin 15 ft. deep and 160,000 sq.yd. in area $94,000.

†**Mont., Fairfield**—Bureau Reclamation, Denver, Colo., plans constructing Greenfield and Ashuvelot Divisions of Sun River Irrigation Project. $250,000. A. W. Walker, Fairfield, dist. engr.

†**Texas**—U. S. Eng., dredging to restore channel, 100 ft. wide, 10 ft. deep from Houston Ship Channel to point on Cedar Bayou, 11 mi. above mouth, incl. protection entrance by jetties $27,000 allotment approved.

BIDS ASKED

†**La., New Orleans**—Jan. 3, by U. S. Eng., Prytania and River Front, constructing 1,140,000 cu.yd. Lobdell-Viola Levee in Atchafalaya Front Levee, Dist., New Levee, Item R 834.

†**La., St. Rose**—Jan. 3, by U. S. Eng., Prytania St. and River Front, New Orleans, enlarging and replacing 1,140,000 cu.yd. levee, St. Charles Co. $90,000.

†**Miss., Gulfport**—Jan. 6, by U. S. Eng., Mobile, Ala., dredging 3,000,000 cu.yd. material, incl. overdepth from Gulfport Ship Channel. Noted Dec. 1.

†**New York**—Jan. 10, by U. S. Eng., Army Bldg., New York, dredging 1,797,000 cu.yd. in Hudson River at Parda Hook, at Hudson River Connecting Railroad Bridge south of Castleton, opposite New Baltimore at East Flats Light, opposite Coxsackie Island, at Nutten Hook, at Welch's Ice House Dock, at Stockport Middle Ground, opposite city of Hudson and opposite Germantown.

†**Va., Norfolk**—Yards & Docks, Navy Dpt., Wash., D. C., taking bids cofferdam of steel sheet piling and fill across entrance channel to dry dock at Navy Yard, Spec. 7104.

CONTRACTS AWARDED

Louisiana—See "Streets and Roads."

†**Louisiana** — U. S. Eng., New Orleans, to Ayres & Graves, Alexandria, 9,500 cu.yd. Johnson Cross Levee, $1,093; 4,542 cu.yd. Upper Barbins New Levee $4,542; 45,000 cu.yd. Lower Barbins Ledge Levee $5,175; 20,000 cu.yd. Brouilette Levee $2,300; 12,000 cu.yd. Bellevey Levee $1,380, all foregoing in Red River, Bayou Des Glaises Levee and Drainage Dist.***to Lower Coast Constr. Co., Godchaux Bldg., New Orleans, 30,000 cu.yd. Mitchell Levee $8,100; 15,000 cu.yd. Paul Hingle Levee $4,050; 33,000 cu.yd. Farm Levee $8,910***13,000 cu.yd. Nairn Levee $3,510; 28,000 cu.yd. Wenck Villa Levee $7,560; 16,000 cu.yd. Alberti Levee $4,320; 23,000 cu.yd. Johnson Levee $6,750; 40,000 cu.yd. Armstrong Levee, $10,800, all foregoing in Barataria Levee Dist.***to Dameron & Kenyon, Port Allen, 580,000 cu.yd. Sect. S 145-E, Alexandria West Levee $40,600; 740,000 cu.yd. Item S 145-D same levee $51,800; 800,000 cu.yd. Item S 145-C same levee $56,000; 670,000 cu.yd. Item S 145-B, same levee $46,900; 210,000 cu.yd. Item S 145-A, same levee $14,700, all foregoing in Red River, Atchafalaya and Bayou Boeuf Levee Dist., Red River. Grand total $278,490. Noted Nov. 24.

†**Minn., Minneiska**—U. S. Eng., 615 Commerce Bldg., St. Paul, constructing lock and dam 5 Mississippi River, to E. E. Gillen Co., 288 East Water St., Milwaukee, Wis., $783,528. Noted Nov. 10.

N. J., Long Branch—Bd. City Comrs., City Hall, constructing 500 ft. timber bulkhead west end section city, to T. Proctor, 218 5th Ave. Est. $17,750.

†**Oregon**—U. S. Eng., Portland, dredging 635,000 cu.yd. from channel in Columbia River at Westport and Wauma Bars, to Hydraulic Dredging Co., Ltd., Oakland, Calif., $50,800.

†**S. C., Charleston**—U. S. Eng., Charleston, dredging 40,360 cu.yd. from Charleston to Beaufort, to J. Olson & Son, Arlington St., Jacksonville, Fla., $7,668.

†**Tenn., Memphis**—U. S. Eng., 3,818,000 cu.yd. earthwork in Lower St. Francis Levee Dist., between Neuhardt and Graves Bayou, Ark., to Brooks-Callaway Co., Healy Bldg., Atlanta, Ga., $419,870. Noted Dec. 1.

DAMS

LOW BIDDERS

Calif., Los Angeles—Supervs. Los Angeles Co., Dec. 19, rock fill dam in San Gabriel Canyon, from West Slope Constr. Co., 810 South Spring St., $8,600,527. Noted Nov. 17.

UNCLASSIFIED

PROPOSED WORK

Ark., Little Rock—HANGAR, etc.—Dpt. P. Wks., Municipality, plans hangar and shops at municipal airport. $30,000.

†**Calif., Sunnyvale**—INTERIOR COMMUNICATING SYSTEM—Yards & Docks, Navy Dpt., Wash., D. C., automatic interior communicating system in hangar, at Naval Air Station, Spec. 7137.

†*Federal Government*

Unclassified (Continued)

Conn., Bridgeport — GAS DISTRIBUTION — Bridgeport Gas Light Co., 815 Main St., plans expending $20,000, for repairs, extensions, replacements and gas main tie ins.

Ind., Hammond—AMUSEMENT PARK—C. L. Worthington, 484 Sibley St., plans by C. W. Frey, Harvey, Ill., amusement park, auto race track, airport, at Wolf Lake, near here. $150,000.

Mont., Great Falls—SWIMMING POOL—City, T. Lease, park supt., plans 16,000 sq.ft. concrete swimming pool.

N. J., Eatontown—INDOOR POLO FIELD—Twin Brook Riding School, W. F. O'Neil, pres., preliminary plans 1½ story, 150x300 ft., indoor polo field, incl. pony stalls, restrooms, offices. $30,000. A. Kellenyi, 25 Lewis St., engr. Monmouth County Polo Club, M. Phillips, in charge, Trenton Ave., lessee. Noted Nov. 3.

N. J., Elizabeth—SPORTS ARENA—Owner, c/o Oakley & Sons, archts., 1259 Clinton Pl., preliminary plans completed 1 story, rein.-con. sports arena, plain found. $300,000. **Maturity indefinite.** Owner now seeking finances. Noted May 26.

N. J., Red Bank—POLO FIELD—Monroe Eisner, Red Bank, plans polo field, incl. grading, sodding, $25,000. Engineer not selected. Maturity indefinite.

O., Youngstown—AIRPORT—M. Moore, mayor, City Hall, requested City Council for appropriation for $150,000 for airport. Land to cost $90,000 paid in period of 6 years, $60,000 for material. Relief labor to be used. G. Cook, city engr.

†Pa., Phila.—DREDGE—U. S. Eng., 1 diesel catamaran dredge.

BIDS ASKED

La., Eaton—LIME KILNS, etc.—See "Contracts Awarded."

†La., Shreveport — AIRPORT — Con. Q.M., Barksdale Field, bids about Dec. 29, constructing 600 ft. concrete runway, 30 ft. wide, in front of wing operations building, Barksdale Field. $23,000.

†N. H., Littleton—ELEVATOR—Jan. 13, by Treas. Dpt., at office Sup Archt., Wash., D. C., passenger elevator.

N. Y., Hudson—ELEVATOR—Jan. 12, by Superintendent Div. Standards & Purchase, State Office Bldg., Albany, electric elevator, storehouse, New York Training School for Girls.

N. Y., New York—TRACK WORK—Dec. 31, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., special track work, spare parts (frogs, switches and housings) for Independent City-owned Rapid Transit Railroad System.

Tex., Eden—GAS PIPE LINE, etc.—See "Contracts Awarded."

†C. Z., Coco Solo—PIER, etc.—Jan. 25, by Yards & Docks, Navy Dpt., Wash., D. C., earth filled steel sheet pier and service piping and removing existing timber pier at Naval Submarine Base, Spec. 7141. Noted Dec. 22.

CONTRACTS AWARDED

Calif., Los Angeles—TELEPHONE LINES, etc.—Metropolitan Dist., 306 West 3rd St., constructing telephone lines in Lakeview-Banning-Cabazon Sect., consisting of 16.7 mi. bracket telephone line and 2 installations of telephone protective equipment, using Southern pine and Western red cedar poles, to H. H. Walker, Inc., Newberry Electric Co. and Quality Electric Co., 1323 Venice Blvd., $8,742; headquarters building in Banning Dist., to Sierra Equipment Corp., 445 South San Pedro St., $4,972. Noted Dec. 1.

Calif., Venice—GRANDSTAND, etc.—L. A. Motorboat Speed Corp., 827 South Sierra Bonita Ave., 22x426x18 ft. timber grandstand, concession buildings, frame field office, Ocean Ave., to General Engineering and Constr. Co., 1001 North Mansfield Ave., Los Angeles. Est. $150,000 or more.

La., Eaton—LIME KILNS, etc.—Louisiana Lime Products Co., c/o W. G. Gray, Alexandria, development work, incl. lime kilns, day labor and separate contracts. $35,000.

†Mass., Boston—MAIL HANDLING EQUIPMENT, etc.—Treas. Dpt. at office Sup. Archt., Wash., D. C., mail handling equipment for U. S. Post Office, Devonshire, Milk, Water and Congress Sts., to Damson Co., Eastwood, Syracuse, N. Y.; scales to Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill. Noted Apr. 2, 1931, under "Federal Govt."

Mass., Brighton—STABLES—Jabez Hollett, general contractors, 17 Gladstone St., Greenwood, plumbing for stables, Soldiers Field Rd., for Metropolitan Driving Club, W. J. McDonald, pres., to Lappin Bros., 8 Union St., Malden; electrical work to Bliss & Sage Electric Co., 104 Exchange St., Malden. Bids in spring for clubhouse. Noted Dec. 1, under "Contracts Awarded."

†N. J. Fort Monmouth—LIGHTING SYSTEM—Con. Q. M., street lighting system for fort, to J. Ringelbe, 144 Norwood Ave., Long Branch. Est. $25,000. Noted Oct. 6.

N. Y., Brooklyn—COAL POCKETS—V. Cirillo, 3902 14th Ave., concrete coal pockets, 38th St. and East 13th Ave., to Nicholson Co., 405 Lexington Ave., New York. Est. $28,000. Noted Dec. 22.

N. Y., Brooklyn—RAILROAD STRUCTURE—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, altering railroad structure on Caton Ave. and East 2nd St. to Seaboard Eng. & Bldg. Corp., 50 Church St., New York, $5,269. Noted Nov. 24.

†O., Cleveland—ELEVATOR PLANT—Treas. Dpt., at office Sup. Archt., Wash., D. C., elevator plant in U. S. Post Office, to Otis Elevator Co., 810 18th St., Wash., D. C., $267,378. Noted Oct. 13.

Pa., Edwardsville—DRYING PLANT—Glen Alten Coal Co., Scranton, razing present sand drying plant at Diamond Colliery, Scranton and transporting and reconstructing same at Woodward Colliery, concrete founds., to A. J. Sordoni, Forty Fort, Est. $20,000.

†Pa., New Castle—ELEVATORS—Treas. Dpt., at office Sup. Archt., Wash., D. C., 2 freight elevators in new U. S. Post Office, to Haughton Elevator & Machine Co., Vermont Bldg., Wash., D. C., $8,600.

Tex., Eden—GAS PIPE LINE, etc.—Southwestern Gas & Pipe Line Co., Eden, I. C. Watson, in charge, plans lines to serve Eden, Paint Rock and Millersview, day labor and separate contracts. $40,000 or more.

Tex., Port Arthur — CRUSHING PLANT — Great Lakes Coal & Coke Co., c/o J. C. Muller, Port Arthur, plans completed addition to crushing plant, screening and sizing plant. $25,000. Owner may use day labor. Private plans.

MATERIALS AND EQUIPMENT

PROPOSED WORK

CABLE—Los Angeles, Calif.—City, A. J. Holm, purchasing agent, City Hall, rescinded contract and rejected all other bids for furnishing lead covered telephone cable, Spec. 2941. Noted Dec. 15 under "Contracts Awarded."

ASPHALT, etc.—Chicago, Ill.—Dpt. P. Wks., City Hall, bids in February 5,000 tons oil asphalt; 10,000 tons Trinidad asphalt; 400,000 gal. flux oil; 40,000 gal. fuel oil; 40,000 cu.yd. asphalt or masons sand; 500,000 paving brick; 600,000 gal. (paving) tar; 7,500 tons limestone dust; 60,000 cu.yd. ½ in. limestone; 15,000 cu.yd. limestone screenings; 10,000 bbl. Portland cement; 2,000 bbl. high early strength cement; 5,000 cu.yd. torpedo; 5,000 cu.yd. sand. A. A. Sprague, comr.

MOTOR, etc.—Chicago, Ill.—City, Dpt. P. Wks., furnishing, designing, erecting 1 motor for 22nd Street Pumping Station, and repairing turbo-generator at Municipal Power Plant. M. Reynolds, city engr.

TERRA COTTA PIPE, etc.—Winston-Salem, N. C.—City soon takes bids 18 mi. terra cotta sewer pipe, 250,000 brick, 330 manhole covers, pumps and materials for pumping station, 100 tons c.i. pipe for sewerage extension. G. W. Coan, mayor.

EXCAVATING and PILE DRIVING EQUIPMENT—Portland, Ore. — LaDee Logging Co., 1304 Amer. Bank Bldg., plans purchasing pile driving and excavating equipment.

WATER PIPE—Rapid City, S. D.—City, soon takes bids 800 lin.ft. 15 in. c.i. water pipe. H. W. Zolphar, city engr.

TANKS, etc.—Burlington, Wis.—Cosden Oil Co., c/o F. W. Callahan, div. mgr., plans four 11,500 gal. vertical tanks and equipment, dikes, etc., corrugated iron warehouse and frame pump house at C. M. & S. P. & P. Ry. east of McHenry St.

BIDS ASKED

TELEPHONE CABLE—Los Angeles, Calif.—Jan. 3, by A. J. Holm, city purch. agt., 34,725 lin.ft. lead covered telephone cable, Spec. 2954.

LUMBER—Chicago, Ill.—Jan. 4, by Dpt. P. Wks., City Hall, furnishing, delivering to various locations by truck, various grades of lumber being yearly requirements during 1933. A. A. Sprague, comr.

†CLIPS—New Orleans, La.—U. S. Eng., taking bids 7,000,000 non-corrosive clips for use with articulated concrete mattresses.

ROAD GRADER—Park Rapids, Minn.—Hubbard Co. taking bids 1 road grader. A. R. Taubman, Park Rapids, co. hy. engr.

†STEEL PLATES, etc.—Bremerton, Wash.—Jan. 4, by Supply Officer, Puget Sound, Navy Yard, 88,740 lb. (17 plates) steel plate, hull, medium Grade M, 30 lb. sq.ft., 72 in. width, 348 in. length, 7,920 lb. (1 plate) 96 in. width, 396 ft. length, 20,250 lb. (3 plates) 72 in. width, 300 ft. length, 15,000 lb. (2 plates), 1,092 lb. (2 plates) 60½ in. width, 6 lb. sq.ft., 204 in. long; 500 lb. wire iron, black, soft or steel, 10 lb. coils, and 800 lb. wire iron galvanized, 50 lb. coils, both .0808 in. diam., and 550 lb. wire, iron galvanized, 50 lb. coils, .2070 in. diam.; 1,200 lb. steel, hexagon bars 1½ in.; 1,000 lb. black bar steel, flat, 16-20 ft. long ½x½ in. and 1,300 lb. same ½x4 in.

†CONDENSATE PUMP—Huntington, W. Va.—Jan. 3, by U. S. Eng., Huntington, motor driven condensate pump, complete with receiver and control switches, at Lock 24, Ohio River.

PAVING MATERIALS—Marshfield, Wis.—See "Streets and Roads, under Contracts Awarded."

CONTRACTS AWARDED

CEMENT—Los Angeles, Calif.—Supervs. Los Angeles Co., furnishing 4,250 bbls. cement for use in connection with protection works in Big Tujunga Wash, to Southwestern Portland Cement Co., 1719 Industrial St., at $1.96 per bbl.

STEEL PIPE—Los Angeles, Calif.—City Purchasing Agent, 2,500 pieces 16 gage, 6 in. x 3 ft. steel pipe, asphalt dipped, plain ends, to Western Pipe & Steel Co., 5717 Santa Fe Ave., at 60c. each.

ROAD OIL—Merced, Calif.—P. J. Thornton, clk. Merced Co., furnishing 10,000 to 30,000 bbls. road oil to J. R. Graham, Sr., 527 N. St., Merced, at $0.55 per bbl.

QUARRY WASTE—Oakland, Calif.—City Port Comm., 4,500 cu.yd. quarry waste for use in connection with Middlefield Rd. extension to Garbage Wharf, to U. B. Lee, 1059 Carpentier St., San Leandro, 48.9c. per cu.yd. Noted Dec. 15.

CAST IRON PIPE—Vernon, Calif.—City, to National Cast Iron Pipe Co., 625 South Western Ave., Los Angeles, furnishing 276 tons bell and spigot c.i. pipe, 24 in. at $4.61 ft., 20 in. pipe at $3.46 per ft., 18 in. pipe at $2.96 per ft., 16 in. pipe at $2.47 per ft., 12 in. pipe at $1.58 per ft.

LIQUID CHLORINE—Ventnor, N. J.—Dec. 27, by Bd. City Council, City Hall, 10,000 lb. liquid chlorine in cylinders. $5,000. E. G. Rightmire, 530 Guarantee Trust Bldg., Atlantic City, city engr.

PUMPS—Boston, Mass.—City, Supply Dpt., P. A. Chapman, supt., 801 City Hall Annex, 2 electrically driven Dayton-Dowd pumps for water service at Deer Island Penal Institution, also electrical equipment for same, to Power Equip-

STRUCTURAL STEEL—St. Louis, Mo.—Bd. P. Serv., City Hall, structural steel, for Cole and Callaway Counties, to Stupp Bridge & Iron Co., 3800 Weber Ave., St. Louis, $15,574***furnishing asphalt plank for bridge over Missouri River, Cole and Callaway Counties, to servicised Products Corp., 6051 West 65th St., Chicago Ill., $2,548***timber for bridge, Cole and Callaway Counties, to Wheeler Lumber Bridge & Supply Co., Kansas City, $14,644. Grand total $32,766.

PIPE — Richmond, Va. — Municipality, 800 tons cast iron pipe, to Glamorgan Pipe & Fdry. Co., Lynchburg.

FOREIGN

Argentina, La Plata—Argentine Government, Buenos Aires, petroleum refining (cracking unit), to M. W. Kellogg Co., 225 Bway., New York, est. $600,000 or more; Government will spend $400,000 reconstructing additional cracking units in this plant. Noted Mar. 24.

Cuba, Pastelitto—Consolidated Railroads of Cuba, Havana, Cuba, and 100 East 45th St., plans repairing sugar warehouse, damaged in hurricane. To exceed $100,000.

Manchuria, Fushun—South Manchuria R.R., Mukden, Manchuria, plans plant for research on oil extraction for coal. To exceed $50,000.

Mexico—Mexican Govt., Mexico City, plans ship yards for construction naval craft, at Mexican Atlantic seaports. To exceed $1,000,000. Project is sponsored by 4th Railroadamen's Congress, Mexico City.

Spain, Madrid — Government, Madrid, plans garage and servicing of cars of government officials. To exceed $400,000.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Pasadena—City plans sub-station, North Santa Anita Ave. $190,000. City plans expending $638,575 for construction of substations during coming year.

Colo., Denver—City plans art museum, facing civic center. $300,000 Architect not appointed.

Mo., St. Charles — City Council passed ordinance providing for city-wide election Jan. 5, on proposal for city to issue $300,000, for constructing municipal light and power plant. Russell & Axon, consult. engrs., prepared tentative plans for municipal power plant, Roosevelt Bldg., St. Louis. Noted Dec. 22.

Mo., St. Louis—Bd. Educ., E. T. Friton, bldg. comr., 911 Locust St., indefinitely postponed construction high school, Kingshighway Blvd., and Arsenal St., $900,000; and high school for Carondelet Dist., $300,000. Noted Oct. 22, 1931 and Apr. 22.

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†Federal Government

Public Buildings (Continued)

Mo., University City—University City Public Schools, C. Banks, supt., 6701 Delmar Blvd., plans Junior High School, rein.-con., brick, stone, Hanley Rd. and Balson Ave. **Maturity indefinite.** Purchase of site contemplated.

†N. Y., Buffalo—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by E. B. Green & Son, 1 Niagara Sq., and Bley & Lyman, 505 Delaware Ave., U. S. Court House. $2,000,000. Noted Sept. 29.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., rejected bids for constructing office for Dpts. Health, Hospitals and Sanitation, Worth, Center and Lafayette Sts. $4,000,000. Indefinite whether or not new bids to be taken. Foundation work completed. Noted Feb. 25.

O., Celina—Bd. Educ., c/o F. A. De Curtain, 327 East Wayne St., soon takes bids 3 story, 114 x 130 ft. high school. $105,000.

Utah, Provo—State Mental Hospital Bd., will apply to coming legislature to provide funds for garbage building, new refrigeration plant, heating plant and remodeling and additions to new units. Engineer and architect not appointed.

BIDS ASKED

†Ariz., Yuma—Jan. 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office. Noted Feb. 18.

Calif., Talmadge—Jan. 10, by State Dpt. P. Wks., Div. of Architecture, Sacramento, seven 1 story, rein.-con. buildings, creamery, barns, etc., State Hospital Grounds. $40,000. Noted Sept. 15, under "Industrial Buildings."

†Tex., Fort Bliss—Jan. 17, at office Con. Q.M., constructing and completing 1 warehouse at William Beaumont General Hospital.

†Tex., Fort Sam Houston—Jan. 13, by Con. Q.M., constructing 21 company and 3 field officers' quarters at Fort Sam Houston. Noted Dec. 15.

CONTRACTS AWARDED

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., Wash., D. C., Central Heating Plant, to Rust Eng. Co., Koppers Bldg., Pittsburgh, Pa., $1,489,900. Noted Nov. 10.

†Fla., Daytona—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to O. Misch, 159 East Columbia St., Detroit, Mich., $152,625. Noted Oct. 20.

†Me., Limestone—Treas. Dpt. at office Sup. Archt., Wash., D. C., inspection station, to Onesime Bolduc, Waterville, $23,815. Noted Oct. 20.

Mass., Cambridge—Cambridge City Hospital, 1493 Cambridge St., plumbing for boiler house addition, to T. J. Murphy & Co., 8 Walden St.; electrical work, to M. B. Foster Electric Co., 514 Atlantic Ave., Boston. Noted Dec. 15, under "Contracts Awarded."

†Mass., Rockland—McDe Constr. Co., general contractors, 205 Church St., New Haven, Conn., heating and plumbing for U. S. Post Office, Webster and Park Sts., to Taylor Heating Co., 714 Broad St., Providence, R. I., for Treas. Dpt. at office Sup. Archt., Wash., D. C. Noted Aug. 25.

†Mich., Selfridge Field—Con. Q.M., 1 story, 65x125 ft., brick, concrete quartermaster's maintenance building, to Banbrook-Gowan Co., 4829 Woodward Ave., Detroit, est. $54,000*** 1 story, 102x107 ft., brick, steel garage, to J. A. Utley, 729 Penobscot Bldg., Detroit, est. $54,000 ***2 story, basement, 52x130 ft., brick, steel, concrete service club and officers' mess building, to Atkin & Stock, 8544 Grand River Ave., Detroit, est. $99,000. Noted Nov. 10 and 17.

Mo., St. Louis—Boaz Kiel Constr. Co., general contractors, Ambassador Bldg., 411 North 7th St., 4,200 cu.ft. marble for use in new city auditorium, 14th and Market Sts., for Bd. P. Serv., City Hall, to Carthage Marble Co., Carthage. Est. $76,000. Noted July 28, under "Contracts Awarded."

†Mo., St. Louis—Treas. Dpt. at office Sup. Archt., Wash., D. C., clearing site for U. S. Post Office, Market St. to 18th to Moore Sts., to Clark Ave., 17th and Walnut Sts., to Thomas & Jones Wrecking Co., 2347 Randolph St., $1,500. Noted Nov. 24.

†N. J., Phillipsburg—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to S. Plato, Coatesville, $79,750. Noted Oct. 20.

O., London—State, Columbus, installing heating units at London Prison Farms, near here, to W. K. Mitchell, 2940 Ellsworth St., Phila., Pa., $19,975; installing boiler, to E. Keller Co., Williamsport, Pa., $13,845.

†Tex., Cisco—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to H. W. Underhill Constr. Co., 235 North Waco St., Wichita, Kan., $75,000. Noted Nov. 10.

†Utah, Ogden — Treas. Dpt. at office Sup. Archt., Wash., D. C., concrete, brick forest service building, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $229,000 base bid. Noted Nov. 17.

†Utah, Tooele—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to G. A. Whitmeyer, Ogden, $52,610. Noted Dec. 1 Daily.

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COMMERCIAL BUILDINGS

PROPOSED WORK

Conn., Stamford—Congregation Agudas Shelon, I. Davidoff, chn. Building Com., 1 story, basement, 50 x 100 ft., brick, limestone synagogue, Main and Grove Sts. Project in abeyance. W. Snyder, 101 Park Ave., New York, archt. Noted Dec. 1.

Ill., Chicago—Chinese Government, Shanghai, China, plans by Chinese Society of Architects, P. Y. Ho, chn. Executive Com., Shanghai, China, plans exposition building with tower, incl. Chinese village, government buildings, tea garden, restaurant, narrow streets lined with booths, gardening effects, 23rd St., at Century of Progress. $300,000. Noted Aug. 25.

Ind., Indianapolis—Hugh McK. Landon, Woodstock Dr., plans suburban residence. $100,000. **Maturity in spring.**

Ia., Ankeny — Ankeny First Congregational Church plans church. $105,000. **Maturity indefinite.** Engineer and architect not appointed.

Mass., Boston—Copley Square Hotel, c/o E. Spracklin, Hotel Lenox, Exeter St., plans remodeling Copley Square Hotel, Huntington Ave. To exceed $150,000. Architect not appointed.

Miss., Gulfport—Gulf Coast Military Academy, Gulfport, plans replacement of 3 buildings destroyed by fire, Barracks of Company "C", Mess Hall and extra barracks building. Engineer and architect not appointed.

Mass., Boston—Shepard Stores, 30 Winter St., plans by H. E. Davidson & Son, 185 Devonshire St., department store alterations, Winter St.

Mass., Haverhill—Polish National Home, V. Radulski, pres., 226 Wilson St., Haverhill, 2½ story, basement, 40 x 102 ft., brick club house, concrete found., Washington St. **Maturity in spring 1933.**

Neb., Beatrice — Goldstein & Isaacson, Beatrice, plans rebuilding stores and storage, $130,000. Maturity indefinite. Fair Store, Beatrice, lessee.

N. H., Bristol—F. Schneider, Pleasant St., plans theatre, store and office, East Main St. **Maturity, probably in spring 1933.** Architect not appointed.

N. H., New Ipswich — Appleton Academy, plans by H. L. Meacham Asso., 120 Front St., Worcester, Mass., 1 story, basement, 60 x 85 ft., concrete, brick gymnasium. To exceed $25,000. **Maturity spring 1933.** Noted Feb. 25, under "Sports and Parks."

†N. J., New Brunswick—Treas. Dpt. at office Sup. Archt., Wash., D. C., sketches 3 story, basement, brick, steel post office. $460,000. **Maturity in spring.** Bids on site under consideration.

N. J., Rochelle Park—D. Salnick, Semisken Pl., Maywood, plans rebuilding Eldorado Road House, 1 story, brick, plain found., Route 4. $150,000. **Maturity indefinite.** Engineer and architect not appointed.

N. J., Union—Owner, c/o C. C. Bell, archt., 8 South Ave. W., Cranford, plans twenty 2½ story, basement, brick, frame residences, garages, plain founds., Lentz Ave. $150,000. **Maturity soon.**

N. Y., Bronxville—Tribune Investors, Inc., c/o Prince & Ripley 230 Park Ave., Inc., New York, plans developing sub-division on 14 acre tract, incl. dwellings. $200,000.

N. Y., Mamaroneck—A. Campbell, c/o T. B. Sutton, 83 Boston Post Rd., Larchmont, plans residential development, incl. sub-division sewers, water, streets and group 1 family dwellings. To exceed $105,000. **Maturity indefinite.**

Pa., Bryn Athyn—National Memorial Shrine, G. M. Warthen, pres., 5th and Walnut Sts., Phila., plans by Dreher & Churchman, Otis Bldg., Phila., memorial, to be reproduction of the Taj-Mahal (made of white marble), surrounded by gardens, trees and fountains, between Bustleton Pike and County Line. $1,000,000 Harrison, Mertz & Emlen, Inc., 5328 Greene St., Phila., engrs.

Wis., Milwaukee—Plankington Hotel Corp. soon takes bids, altering hotel. $100,000. R. Phillip, 707 North Bway., archt.

BIDS ASKED

Ill., Chicago—See "Contracts Awarded."

N. Y., Brooklyn—Brooklyn Borough Gas Co., Mermaid Ave., bids about Feb. 1, general contract 4 story top addition to office and showroom, Mermaid Ave. and West 17th St. Bloch & Hesse, 18 East 14th St., New York, archts. Noted Dec. 1.

CONTRACTS AWARDED

Ill., Chicago—A Century of Progress, Burnham Park, replica Old Mexico Nunnery, Mayan Temple, to B-W Constr. Co., 720 North Wabash Ave. Est. $100,000. Work started. Noted Nov. 24.

Ill., Chicago—Southern Cypress Mfg. Assn., 225 Barnett Natl. Bank Bldg., Jacksonville, Fla., exhibition structures, historic replica, at Century of Progress, by day labor. $35,000. Noted Dec. 1.

La., New Orleans—H. G. Hill Stores, Inc., 1001 South Broad St., 1 story, 180x300 ft. stucco, T-shaped store building, Carrollton Ave. to C. Woodward, I. & C. Bldg., $150,000.

N. J., Paterson — Wentworth & Vreeland, archts., 140 Market St., general contract 2 story, basement, brick, steel church, Sunday school, fellowship hall addition, plain found., to Samuel Wentworth Hughes Co., 177 Van Houten St. for Bway. Baptist Church, 549 Bway. Est. $[illegible],000. Noted Dec. 8.

N. Y., Brooklyn—Roman Catholic Church of Our Lady of Guadalupe, F. J. Henty, pastor, general contract 65x100 ft. church, 15th Ave., 72nd and 73rd Sts. to P. Rattigan, 326 [illegible] St., Brooklyn, est. $160,000. Noted Oct. [illegible].

N. C., Charlotte—American Trust Co., W. H. Wood, pres., rebuilding bank recently destroyed by fire, South Tryon St., to J. A. Jones Constr. Co., Charlotte. Est. exceeds $100,000.

R. I., North Providence (mail Providence)—Donatelli Constr. Co., general contractors, 1452 Smith St., electrical work for church, Mineral Spring Ave., to Butler & Perry, 7 Pleasant St., Providence, for Catholic Church of the Presentation of the Blessed Virgin. Noted Sept. [illegible], under "Contracts Awarded."

Vt., Brattleboro—Geo. H. Reed Co., Inc., general contractors, 24 Franklin St., Greenfield, Mass., heating and plumbing for infirmary, to J. B. Kennedy Co., Greenfield, Mass., for Brattleboro Retreat, H. C. Ripley, supt. Noted June 9, under "Contracts Awarded."

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ariz., Phoenix—BREWERY—A. J. Eisenbeise, Douglas, plans brewery. $30,000.

Ariz., Phoenix—STEEL PLANT—Consolidated Steel & Tank Co., c/o F. Hegeman, pres., sketches (1st unit), 80 x 150 ft., steel plant, equipped with traveling crane, electric hoist. $65,000.

Ariz., Six Points—DAIRY PLANT—Copper State Creamery, plans rebuilding dairy plant. $80,000. Engineer and architect not selected.

Calif., Los Angeles—BREWERY—Don Carlos Brewing Co. plans brewery, $400,000. Plans are under way and when completed, if Congress authorizes manufacture of beer, beer will be made if not cereal beverages will be. Incorporation papers for Don Carlos Brewing Co., have been filed with secretary of State at Sacramento.

Calif., Los Angeles—WAREHOUSE—Acme White Lead & Color Wks., 3160 Alosta St., plans by C. Beelman, 1019 Union Bank Bldg., 1 story, 180x250 ft., concrete, timber, warehouse, 3150 East Pico Blvd. $35,000.

Ga., Waycross—PLANT ADDITIONS—Taylor, Lowenstein Co.., lessee, leased property on which it will construct plant additions. To exceed $150,000.

Ill., Chicago — WAREHOUSE—Western Cold Storage Co., 208 West Washington Blvd., plans altering and repairing warehouse, 439 East South Water St. $30,000. Engineer and architect not selected.

Ill., Paris—GRIST MILL—Phillips Best & Co., plans altering and repairing equipment and additions to brewery grist mill. $28,000.

Ind., Connersville — FACTORY — Cambridge City Ice & Dairy Co., preparing plans steel, brick, tile factory. $29,400. Private plans.

Ind., Frankfort—PLANT—Glover Ice Cream Co., preparing steel plant. $40,000. **Maturity in spring.** Private plans.

Ind., Gary—STORAGE—J. E. Burke, Gary, plans storage and warehouse. $90,000. Engineer and architect not selected.

Ind., Indianapolis—FACTORY—Owner, c/o S. A. Craig & Co., archts., Indianapolis, plans brick, rein.-con. factory. $29,000. **Maturity in 1933.**

Ind., Portland—FACTORY—Jay Garment Co., Portland, preparing plans brick, steel factory addition. $40,000. **Maturity in spring.** Private plans.

Me., Portland—PLANT, etc.—Blake Rounds Plumbing Supply Co., 26 York St., plans plant and distribution. $65,000. Architect and engineer not appointed.

Mass., Boston—GARAGE, etc.—Owner, c/o F. H. Richenburg, architect, 75 Augustus Ave., Roslindale, plans 1 story, basement, 65 x 100 ft., brick, steel public garage and super service garage, concrete found., D St.

Mich., Albion—PLANT EXTENSIONS—Russell Furnace Co., plans plant extensions, incl. equipment. $28,000.

Mich., Ann Arbor—SERVICE GARAGE, etc.—W. J. Williamson plans service repair garage and gasoline station. $28,000 with equipment.

Mich., Bay City—SHOP ADDITION—De Foe Boat & Motor Wks. plans shop addition. $28,000.

Minn., St. Paul—MARKET—Friedman Bros. Holding Co., St. Paul, plans public market, incl. stalls, dry or refrigeration storage, garage, and

†Federal Government

Industrial Buildings (Continued)

office. $450,000. Reconstruction Finance Corp. approved loan.

Miss., Greenville — PLANT — International Vegetable Oil Co., plans altering and repairing cotton seed storage plant. $60,000 or more. Engineer and architect not appointed.

Mont., Great Falls — BREWERY — Montana Brewery, c/o W. H. Jensen, 207 North 3rd Ave., plans altering brewery, incl. equipment. $50,000 or more.

Mont., Jefferson City—MILL—Callahan Gold Mining Co. plans rebuilding stamp mill. $30,000. O. F. Brinton, Jefferson City, engr.

Neb., Omaha—SERVICE GARAGE and GASOLINE STATION—J. Schneiderwind, 2812 Ed. Creighton Ave., plans service garage repair and gasoline station with equipment. $28,000.

Neb., O'Neil—GARAGE—J. Seybold, O'Neil, plans service garage, with equipment. $28,000. Maturity indefinite.

N. J., Boonton—FACTORY—Corporation, c/o E. F. Drew & Co., 15 East 26th St., New York, plans factory. To exceed $40,000. **Maturity indefinite.** Engineer and architect not appointed.

N. J., Newark — MARKET — Newark Farm Produce Market, Inc., Raymond Blvd., plans market, Chapel and Lockwood Sts. $55,500 loan from Reconstruction Finance Corp.

N. J., Newark—WAREHOUSE—N. J. Convery, archt., 32 Walnut St., soon takes bids super structure 2 story, basement, brick, steel, ware house addition, 1061 Raymond Blvd. for M Augenblick & Bros., 1061 Raymond Blvd., est. $40,000. Foundation and paving awarded to Shore Constr. Co., 94 Christie St., Noted Dec. 22.

N. J. Paterson—FARMERS MARKET—Owner c/o J. Holt, archt., 134 Market St., plans 1 story, basement, brick, steel, farmers market, plain found., East Railway and Dundee Aves., $40,000.

N. J., Perth Amboy—FACTORY—Manheimer & Kasse, 360 7th Ave., New York, plans factory addition, Washington and Division Sts. $40,000. Engineer and architect not selected. American Tobacco Co., 111 5th Ave., New York, lessee.

N. Y., New York—DISTRIBUTION PLANT—National Biscuit Co., 449 West 14th St., plans by L. Wirsching, Jr., 449 West 14th St., 5 story, 100x206 ft., brick, steel, distribution and food products plant, incl. spur track of New York Central R.R., 10th Ave. and 15th St. $600,000. Railroad prepared plans for foundations and track.

N. Y., New York—FURNITURE STORAGE, etc.—Spur Furniture Co., lessee, c/o E. Eichenwald, 425 East 15th St., acquired lease and 5 story building will be altered for furniture storage, refinish and showrooms to meet lessees' requirements, 826 7th Ave.

N. C., Wilmington—STORAGE AND SERVICE—Automobile Supply Co., 116 North 2nd St., Wilmington, plans repairing and extending storage and service building. Est. $30,000. Engineer and architect not appointed. **Maturity indefinite.**

N. D., Minot—SERVICE GARAGE, etc.—D. Levich, 205 8th St. S. E., plans service garage and gasoline station. $28,000 with equipment.

N. Y., New York—STORAGE, etc.—Fidelio Brewery, N. S. Goldberger, pres., 501 1st Ave., plans altering storage and factory, incl. cutting in 2nd floor to accommodate machinery, supports and structural changes, 341 East 38th St., $28,000. J. Douglas Weiss, 119 West 57th St., archt. Noted July 7.

N. H., West Concord—ICE CREAM FACTORY—C. Mamos, plans by N. Simons, 33 North Main St., Concord, 2 story, basement, 40 x 50 ft., brick concrete factory. **Maturity in spring.** Will purchase machinery and equipment.

N. Y., Elizabethtown—STORAGE—Mrs. S Cautin, plans storage and store. To exceed $55,000. Engineer and architect not appointed.

N. Y., New York—GARAGE—G. Paladino Holding Co., 286 East 137th St., plans by DeRose & Cavalieri, 370 East 149th St., 1 story, 107x130 ft., service and repair garage, 182nd St. and Webster Ave. $40,000.

N. Y., New York—SERVICE GARAGE—C. P. Day, 1070 Park Ave., plans by J. J. Dunnigan, 2382 Grand Concourse, service and repair garage, Hunt and Baychester Aves. $28,000 with equipment.

N. Y., New York—SERVICE GARAGE—Owner, c/o West 143rd Street Garage, Inc., lessee, 29 West 143rd St., plans rebuilding 2 or more story service garage. To exceed $45,000. **Maturity indefinite.**

O., Akron—BREWERY—Renner Products Co., E. C. Deibel, pres., 275 North Forge St., plans modernizing brewery. $200,000.

O., Canton—BREWERY—Home Brewing Co. (re-organized), 108 3rd St. S., plans modern brewery plant. $100,000. Private plans.

O., London—GARAGE, etc.—R. D. Landsittel, plans service garage, repair and gasoline service. $28,000, incl. equipment.

O., Wellington—SERVICE GARAGE, etc.—A. Dimick, 204 West Herrick Ave., plans service garage, repair and gasoline station. $28,000.

O., Zanesville—BREWING PLANT—S. Linser, Jr. and Linser Brewing Co., plans new brewing plant. To exceed $500,000. **Maturity indefinite.**

Pa., Butler — PLANT REMODELING — Anonyme des Manufactures, des Glaces et Produits de St. Gobain, Chauncey & Cirey, Paris, France, purchased plant of Standard Plate Glass Co. at receivers sale for $406,000 and plans completely remodeling plant by expansion and installation of latest glass making machinery. Committee of Creditors which has been operating plant to continue for 6 months more, while St. Gobains, complete plans for remodeling; they to be permitted free access to plant. Saint Gobain Co. represented by C. E. Frazier, Washington. E. Gentil, Paris, France, ch. engr.

Pa., Tyrone—FOUNDRY—G. C. Stine Fdry. & Machine Co. plans repairing foundry, damaged by fire. To exceed $125,000. Engineer and architect not appointed.

Tenn., Union City—LUMBER PLANT—Union City Lumber Co., Union City, plans lumber plant. $28,000. Engineer and architect not appointed.

Tex., Dallas—MARKET—Farmers Public Market, 401 Republic Bank Bldg., J. J. Harden, 575 West Main St., Oklahoma City, Okla., pres., plans farmers public market $187,000. Reconstruction Finance Corp. loan approved.

Tex., Dallas—FACTORY, etc.—Owner, c/o Rose-Friedman-Shavn Co., lessee, 800 Commerce St., plans by DeWitt & Washburn, 1229 Kirby Bldg., remodeling factory and wholesale building, damaged by fire, 800 Commerce St. $50,000.

Tex., San Antonio—CREAMERY—Mistletoe Creamery, Austin St., revised plans by A. B. and R. M. Ayres, Smith-Young Tower, 2 story, basement, East Ashley Ave. and Memorial Dr. $100,000. Terrell Bartlett Engineers, San Antonio, engrs. Noted June 9.

Wash., Spokane—PLANT—Spokane Brewing & Malting Co., Lincoln Ave. and Bway., plans by G. A. Pehrsen, Old Natl. Bank Bldg., plant improvements. $75,000.

W. Va., Charleston—FRUIT and PRODUCE STORAGE—Farris Bros. plans repairing fire damaged fruit and produce storage, Court St. $28,000.

Wis., Janesville — BREWERY — Corporation, c/o F. P. Croak, 424 North Washington St., plans reconditioning brewery and equipment. $30,000 or more.

Wis., Oshkosh—BREWERY—Oshkosh Brewing Co., 1631 Doty St., plans altering brewery and equipment. To exceed $35,000.

Wis., Oshkosh—BREWERY—Peoples Brewing Co., 1515 South Main St., plans altering brewery and equipment. $35,000 or more.

Wis., Oshkosh—BREWERY—Rahr Brewing Co., 91 Rahr Ave., plans altering brewery and equipment. To exceed $30,000.

Wash., Montesano — Schafer Bros. Inc., Montesano, plans lumber plant. To exceed $100,000. **Maturity indefinite.**

Wis., Readstown—SERVICE GARAGE, etc.—J. Coher, Readstown, plans service garage and gasoline station. $28,000.

Wyo., Clearmont—LIGHT and POWER PLANT—M. B. Shickley, Clearmont, plans hydro-electric light and power plant. Owner applied for franchise. Engineer not selected.

Que., Pointe aux Trembles—PLANT—Chemicals Ltd., 384 St. Paul St. W., Montreal, plans plant. $200,000.

BIDS ASKED

Calif., Oakland—MARKET—W. H. Weeks, archt., 525 Market St., San Francisco, taking bids, 1 story, basement, brick, market, Franklin St., for F. H. Morgan, et al, 4266 Piedmont Ave. $100,000. Noted Oct. 13.

Ia., Maquoketa—GARAGE, etc.—See "Contracts Awarded."

N. J., Clifton—BOILER ROOM—See "Contracts Awarded."

N. J., Elizabeth—GARAGE—See "Contracts Awarded."

N. J., Morristown—SERVICE STATION—See "Contracts Awarded."

N. Y., Coney Island (sta. Brooklyn)—STORAGE—Owner, c/o W. A. Lacerenza, archt., 16 Court St., Brooklyn, taking bids separate contracts four 3 story, storage, store and apartment buildings, Surf Ave. and West 22nd St. To exceed $35,000. Noted Dec. 8, under "Brooklyn."

N. Y., Yonkers—SERVICE GARAGE—See "Contracts Awarded."

N. Y., Yonkers—STORAGE, etc.—See "Contracts Awarded."

N. Y., New York — SERVICE GARAGE — Grand Central Terminal Corp., J. P. Carney, pres., Grand Central Terminal, bids about Apr. 1, 3 story, 73 x 100 ft. service garage, 333 East 47th St. $30,000. A. J. Thomas, 23 West 47th St., archt. Noted Dec. 8.

O., Cincinnati—SALES, etc.—See "Contracts Awarded."

O., Youngstown—BREWERY ALTERATION—See "Contracts Awarded."

Okla., Blackwell—SMELTER—See "Contracts Awarded."

Wis., Janesville — SERVICE GARAGE — See "Contracts Awarded."

Wis., Madison—SERVICE GARAGE, etc.—See "Contracts Awarded."

Wyo., Sheridan—BREWERY—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., New Britain — BREWERY — Cremo Brewery, Belden St., J. Skritulsky, pres., 102 Vine St., repairing brewery recently damaged by fire and go ahead with rehabilitation, incl. purchase of equipment. Owner builds. $60,000. Noted Dec. 8.

Ia., Maquoketa—GARAGE, etc.—Dale Easton, service garage and gasoline station, separate contracts. $28,000 with equipment.

Mass., Everett—FACTORY—New England Tank & Tower Co., 42 Main St., plumbing for factory, 81 Tileston St., to Matto & Rosen, 58 North Margin St., Boston; electrical work, to J. J. Cannell, 11 Cottage St.; heating will be done by owner. Noted Oct. 6, under "Contracts Awarded."

Miss., Columbia—GARMENT PLANT—Marion County Chamber of Commerce, garment plant, to Dye & Mullings, Columbia, for Reliance Mfg. Co., 212 West Monroe St., Chicago, Ill. Est. $70,000.

Mo., Overland — BAKING PLANT — A. J. Lager, 2524 North Woodson Rd., general contract brick, concrete, steel addition, to H. J. Voss, 8842 Olden Ave. Taking sub-bids.

N. J., Clifton—BOILER ROOM—Athenia Steel Co., Clifton Ave., 1 story, brick, steel, boiler room addition, Clifton Ave., by day labor. $28,500. Private plans.

N. J., Elizabeth—GARAGE—Oscar Blum & Sons, 701 Bway., 2 story, basement, brick, steel, garage and showroom, Bway. and 7th St. by separate contracts. $28,500. Constr. Service Corp., 80 Broad St., archt.

N. J., Morristown—AUTO SERVICE STATION—C. L. Dobbs, 182 Speedwell Ave., 1 story, basement, concrete block, stucco auto service station, plain found., and moving present building back, Speedwell Ave. and Henry St., day labor. $28,500. W. S. Slifer, 9 Park Pl., archt. Noted Nov. 10.

N. J., Newark—STORAGE PLANT—Public Service Electric & Gas Co., 80 Park Pl., constructing oil storage plant, Essex Generating Station to United Eng. & Constr. Inc., 80 Park Pl., Newark, est. $28,000; steel tank to Dover Boiler Wks., Inc., 50 Church St., New York.

N. J., Union—DAIRY PLANT—D. A. Hopper, archt., 22 Ridgewood Ave., Irvington, general contract 1½ story, 40 x 360 ft., concrete block, hollow tile, plain found., State Hy. Route 29, to Jamesway Farm Engineers Co., 11 West 42nd St., New York, for Frick Bros., 19 Rodwell Ave., Irvington. Est. $29,000 with equipment. Noted Dec. 8.

N. Y., Brooklyn—BREWERY—Kings Brewing, Inc., 227 Pulaski St., refrigeration for brewery, to York Ice Mchry. Co., 2nd Ave and 42nd St.; power house, to Erie City Iron Wks., Erie, Pa. Noted Dec. 1.

N. Y., New York—PASTEURIZING PLANT—S. Adler, 453 East 133rd St., 2 story, 73x100 ft., pasteurizing plant, 133rd St. and Brown Pl. to Riger Bldg Corp., 145 West 41st St., est. $28,000. Noted Dec. 8.

N. Y., Yonkers—SERVICE GARAGE—Edward Ann Corp., Ann and School Sts., 1 story, 80 x 103 ft. service garage, day labor and separate contracts. $28,000. J. J. Ghidoni, 2 Hudson St., archt. Noted Dec. 22.

N. Y., Yonkers—STORAGE, etc.—Rice Land & Impvt. Co., 103 Park Ave., New York, 76 x 93 ft., storage, loft, store, separate contracts awarded. $30,000. O. G. Getts, 247 Madison Ave., New York, archts. Noted Dec. 22.

N. Y., Yonkers—STORAGE, etc.—Pos-Ken Realty Corp., 16 Court St., Brooklyn, storage, store, office, separate contracts. $65,000. H. L. Quick, 18 South Bway., archts. Noted Dec. 22.

O., Cincinnati—GARAGE—J. and F. Schroth Packing Co., Township Rd., and Mass. Ave., 1 story, basement, 66x99 ft., garage (packing plant), Township Rd. and Cormany Ave., to L. J. Bridelmaier, 1415 Walnut St. Est. $28,000, incl. equipment.

O., Cincinnati—SALES, etc.—Venerio Sanvido, 3162 West 3rd St., 1 story, 60 x 114 ft., brick, concrete sales, service and gasoline station, garage, comfort station, 4412 Denison Blvd., day labor and separate contracts after building permit is issued. $30,000. Boccio & Simon, 3471 Rockey River Dr., archts. Noted Dec. 22.

O., Urbana—DAIRY—McCreery Co., brick, steel, concrete dairy, day labor. $25,000. McCormick Co., 121 South Negley Ave., Pittsburgh, Pa., archts. Owner will purchase materials.

O., Youngstown — BREWERY ALTERATION—Renner Brewing Co., altering brewery, incl equipment, day labor and seperate contracts. $75,000.

Okla., Blackwell — SMELTER — Blackwell Zinc Co., altering and repairing zinc smelter, day labor and separate contracts. $28,000 or more.

Tex., Graham — REFINERY — C. K. Knox, Enid, Okla., fireproof refinery plant for manufacture of gasoline, lubricating oil and by-products, day labor. $250,000. Private plans.

Wis., Janesville—SERVICE GARAGE, etc.—Interstate Oil Co., LaCrosse, service garage, gasoline station, here and other locations, separate contracts.

Wis., Madison — SERVICE GARAGE — L. DuBois, 5 North Mills St., service garage, gasoline station, separate contracts. $28,000.

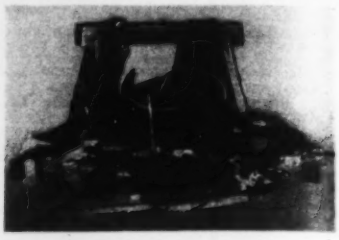
Wyo., Sheridan—BREWERY—Sheridan Brewing Co., H. Kroger, pres., brewery, day labor. To exceed $28,000. Now purchasing equipment.

†*Federal Government* ***For official proposal advertising see Searchlight Section*** *Constr. News page 213*

When pumps must handle water *PLUS*.....

sand or gravel

mud or silt



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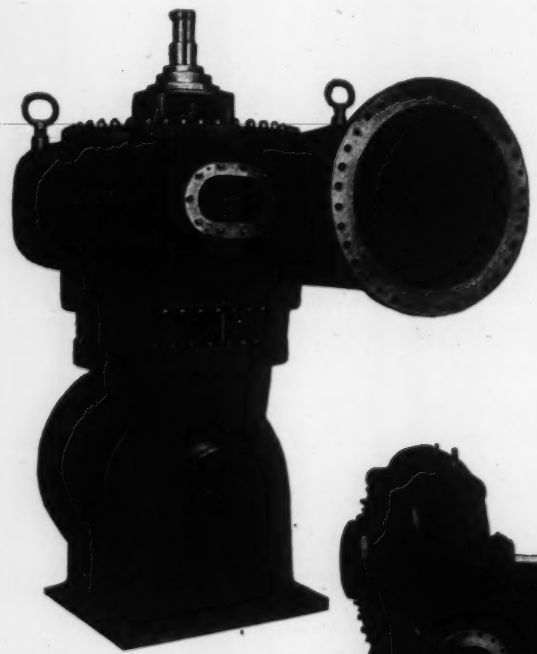

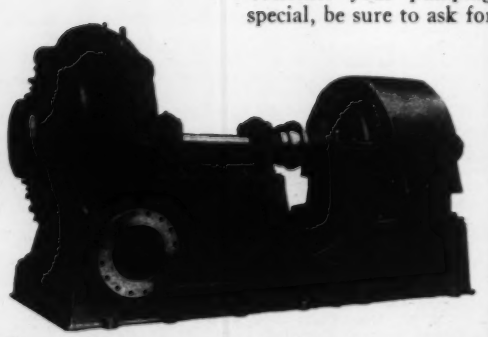

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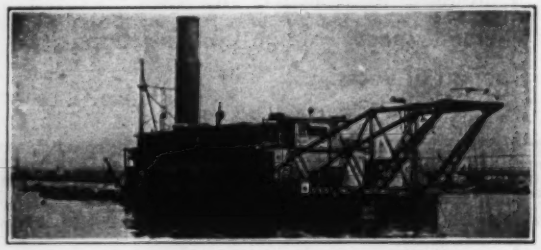

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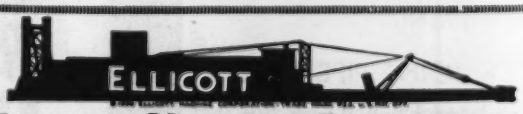

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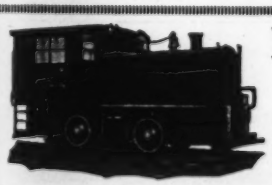

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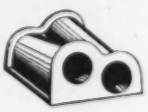

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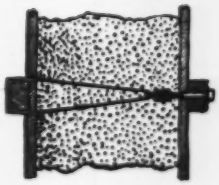

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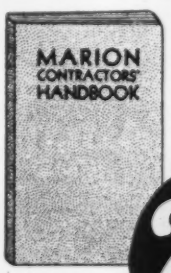

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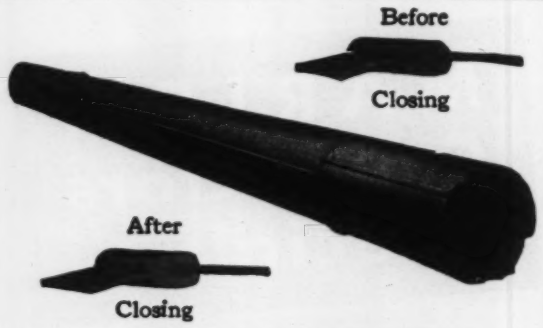

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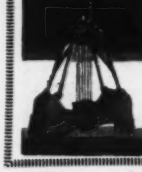

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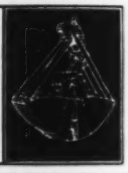

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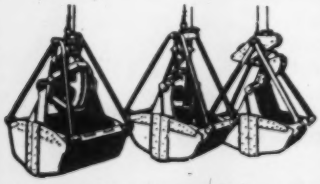

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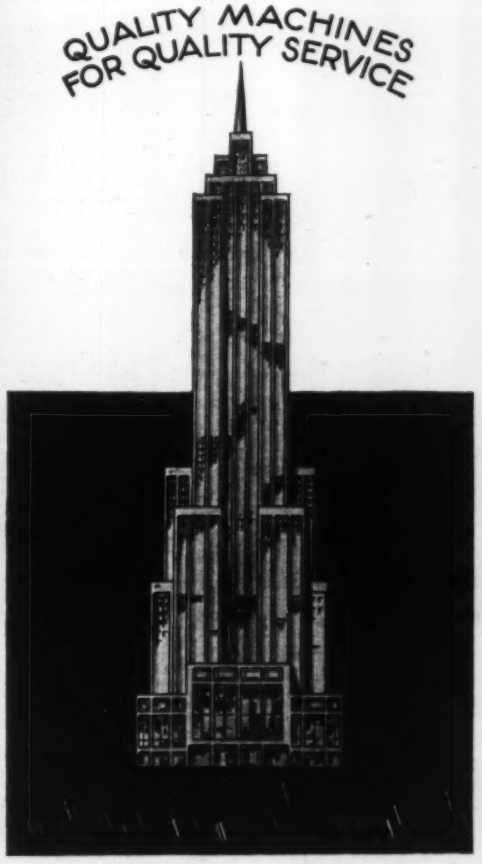

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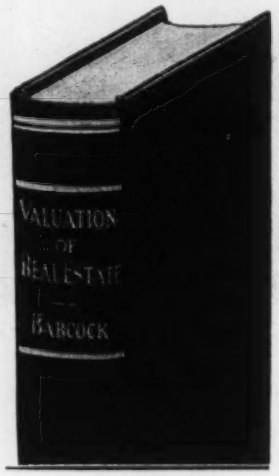

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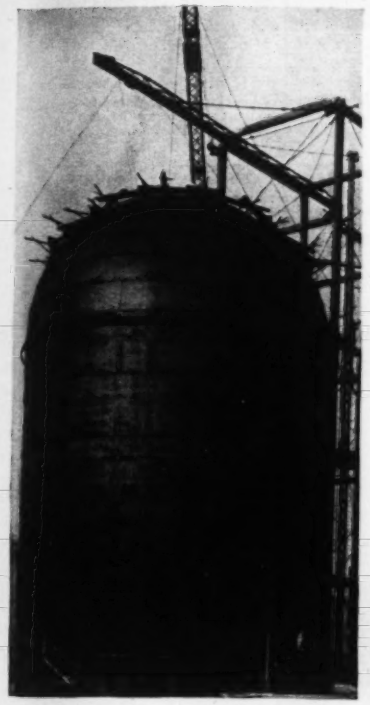

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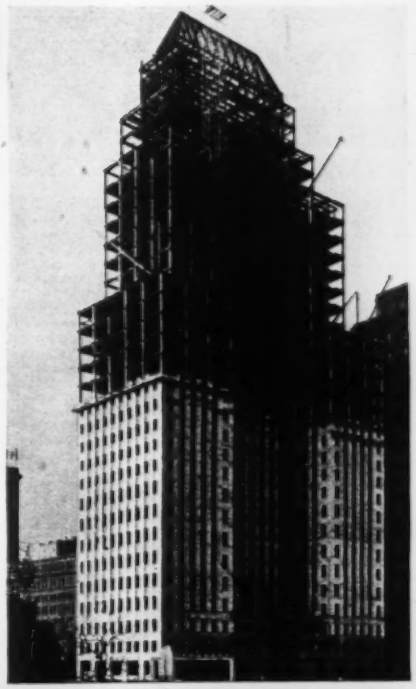

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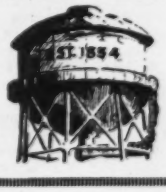

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Bids: January 12.

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ATTICA STATE PRISON
ATTICA, N. Y.
Spec. No. 7384

Sealed proposals covering Construction Work for Mastic Floors in Corridors, State Prison, Attica, N. Y., in accordance with Specification No. 7384 and accompanying drawings, will be received by the Commissioner of Correction, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Thursday, January 12, 1933, instead of as previously advertised.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, State Office Building, New York City.
Commissioner of Architecture, State Office Building, Albany, N. Y.
District Engineer, 109 N. Genesee St., Utica, N. Y.
District Engineer, Weighlock Building, Syracuse, N. Y.
District Engineer, Barge Canal Terminal, Rochester, N. Y.
District Engineer, 65 Court St., Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.
Attica State Prison, Attica, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon a payment of $5.00 for each set of drawings and specifications.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.

DATED: December 6, 1932.

Bids: January 3.

Sea Wall

WESTCHESTER COUNTY PARK COMMISSION
CONTRACT No. 398

Sealed bids for constructing a sea wall approximately 260 ft. long at Neptune Park near the approach to Glen Island Park, City of New Rochelle, will be received at the office of the Westchester County Park Commission, Room 610 in the County Office Building, White Plains, N. Y., until 11:30 a.m., January 3, 1933, at which time the bids received will be publicly opened and read. The work will consist of excavating the mud, depositing a foundation of stone fill, and constructing on same a wall of derrick stone.

Pamphlets containing information for bidders, form of proposal, specifications, and contract drawing may be obtained by intending bidders at above address by depositing $5.00 for same.

The $5.00 deposit will be returned only to those who submit a bid.

The right is reserved to reject any or all bids.

WESTCHESTER COUNTY PARK COMMISSION
By JAY DOWNER,
Chief Engineer.

December 19, 1932.
White Plains, N. Y.

OFFICIAL PROPOSALS

Bids: January 12.

Construction Heating, Etc.

BIGGS MEMORIAL HOSPITAL
ITHACA, N. Y.
Spec. Nos. 7294, 7295, 7296, 7297, 7298 7299 and 7300

Separate sealed proposals covering Construction, Heating, Sanitary and Electric Work, Electric Fixtures, Elevators and Refrigeration Work for Herman M. Biggs Memorial Hospital, Ithaca, N. Y., in accordance with Specifications Nos. 7294, 7295, 7296, 7297, 7298, 7299 and 7300 and accompanying drawings will be received by the Commissioner of Health, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Thursday, January 12, 1933, instead of as previously advertised.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

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District Engineer, 65 Court St., Buffalo, N. Y.
District Engineer, 71 Frederick St., Binghamton, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon a payment of $20.00 for each set of Construction drawings and specifications, and $10.00 for each set of Heating, Sanitary or Electric drawings and specifications, and $5.00 for each set of Electric Fixture, Elevator or Refrigeration drawings and specifications.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.

DATED: December 20, 1932.

Bids: January 13.

Bridge Removal

DEPARTMENT OF PURCHASES AND CONSTRUCTION
SPRINGFIALD, ILLINOIS
December 22, 1932

Sealed proposals will be received at the Springfield office of the Department of Purchases and Construction until 10:00 a.m., Central Standard Time, on January 13, 1933, for the following work, pertaining to the Illinois Waterway:

Contract B-22 Removal of the Ruby Street Bridge over the DesPlaines River, in the City of Joliet, Will County, Illinois.

For further information apply to the Division of Waterways, 220 So. State Street, Chicago.

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 19, 1932.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 25, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office, etc., at Yuma, Arizona.* The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (258)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 22, 1932—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., February 2, 1933, for furnishing all labor and materials and performing all work for *new vaults, etc., in the U. S. treasury building at Washington, D. C.* The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (263)

OFFICE OF THE CONSTRUCTING QUARTERMASTER, Fort Sill, Oklahoma.—Sealed bids, in triplicate, will be received here until 11 a.m. (C.S.T.) January 5, 1933, and then publicly opened for the *construction of one* (1) *Infantry Barrack, one* (1) *Field Artillery Barrack, and one* (1) *Field Artillery Barrack* (Units B & C only) at *Fort Sill, Oklahoma.* A deposit in the amount of $50.00 is required to insure return of plans and specifications. (255)

U. S. ENGINEER OFFICE, Detroit, Mich.—Sealed bids, in duplicate, will be received until 11:00 o'clock a.m., Eastern Standard Time, January 6, 1933, for *dredging* about 1,984,000 cubic yards of material from channel at lower end of *Lake St. Clair, Mich.* Further information on application. (247)

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17 Battery Place, New York City

U. S. Government

SEALED BIDS, indorsed "Bids for extension of building, Specification No. 7100," will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until 11 o'clock a.m., Jan. 18, 1933, and then and there publicly opened, *for extension of main building, at the Naval War College, Newport, R. I.* The work includes concrete; granite; hollow tile; steel, bronze and iron work; slate roofing and sheet metal work; plastering; carpentry and joinery; marble, tile and terrazzo; acoustical treatment; asphalt and cork tile; and plumbing, heating and electrical systems. Specification No. 7100 and accompanying drawings may be obtained on application to the Bureau or to the Commanding Officer, Naval Training Station, Newport, R. I. Deposit of a check or postal money order for $75 payable to the Chief of the Bureau of Yards and Docks, is required as security for the safe return of the drawings and specification. The Government reserves the right to require, prior to the award of the contract, a statement of facts in detail of the business and technical organization and plant of the bidder available for the contemplated work, including financial resources for such part of the work as is not provided for by the stipulation in article 16 of the Standard Government Form of Contract (Construction) to be used, and experience of organization in construction of comparable work. The Government reserves the right to reject any bid respecting which the facts as to business and technical organization, financial resources, plant or building experience, compared with the project bid upon, justify such rejection. A. L. PARSONS, Chief of Bureau, December 3, 1932. (252)

OFFICE OF CONSTRUCTING QUARTERMASTER, Chanute Field, Rantoul, Illinois. Sealed proposals will be received at this office until 2:00 p.m., January 17, 1933 and then opened for *construction of eight double sets of Non-commissioned Officer's Quarters.* Plans and specifications may be obtained from Constructing Quartermaster, Chanute Field, Rantoul, Illinois after deposit of certified check for Twenty-five dollars—payable to Treasurer of the United States (268)

PROPOSALS FOR NEW CONSTRUCTION—Office of the Constructing Quartermaster, Fort Bliss, Texas.—Sealed proposals will be received here until 10:00 a.m., Mountain Standard Time, January 17, 1933, and then opened, for the *construction and completion of one* (1) *Warehouse at William Beaumont General Hospital.* Further information upon application. (251)

(U. S. Govt. ads continued on page 30)

OFFICIAL PROPOSALS

Bids: December 31.

State Road Work

Hartford, Conn.

Plans and proposal forms are now available for the construction of the following projects. Sealed proposals will be received at the office of the State Highway Commissioner, Room 516, State Office Building, Hartford, Connecticut, until 11:00 a.m., Saturday, December 31, 1932.

FEDERAL AID EMERGENCY PROJECTS

Towns of Killingworth and Saybrook: About 20,459 feet of 2½" trap rock bituminous macadam on 5½" trap rock base on the Killingworth-Deep River Road, Route No. 80. State will furnish bituminous material, cement and reinforced concrete pipe, F.A.P. E 59 A.

Town of Sharon: About 13,514 feet of grading on the Sharon-Cornwall Bridge Road, Route No. 4. State will furnish reinforced concrete pipe and cement. F.A.P. E 58 A.

SPECIAL NOTICE: All work on the above projects must be completed before July 1, 1933.

Attention of contractors bidding on the above Federal Aid projects is directed to the Special Provisions required by the United States Government, copies of which are attached to the proposals and will be included in the contract. On these projects, skilled and unskilled laborers shall not be permitted to work more than thirty hours in any one week and the minimum wage paid to all unskilled labor employed shall be thirty-five cents per hour and to all skilled labor employed shall be fifty cents per hour.

TRUNK LINE PROJECTS

Town of Bristol: About 11,193 feet of 2½" bituminous macadam on 5½" trap rock base on the Waterbury-Bristol Road, Route No. 119. State will furnish reinforced concrete pipe and bituminous material.

Town of Woodstock: About 8,935 feet of 2½" bituminous macadam on 5½" trap rock base on the North Woodstock-East Woodstock Road. State will furnish reinforced concrete pipe, cement and bituminous material.

STATE AID PROJECTS

Town of Hartland: About 4,742 feet of trap rock waterbound macadam on the Hartland Pond Road (Mill Street). State will furnish reinforced concrete pipe.

Town of Saybrook: About 6,018 feet of trap rock waterbound macadam on the Bushy Hill Road, Route No. 144. State will furnish reinforced concrete pipe.

NOTE: A certified check or surety company bond, on form furnished by the Highway Commissioner, for one-third of the amount of the bid must accompany each proposal unless the contractor shall have filed with this office an annual proposal bond. The State Highway Commissioner reserves the right to reject any and all bids.

JOHN A. MacDONALD,
State Highway Commissioner.
State Office Building, Hartford, Conn.

Bids: January 10.

Reconstruction of Highways

STATE DEPARTMENT OF PUBLIC WORKS—DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p.m., on Tuesday, January 10, 1933, for the reconstruction of highways in the following counties:

	Deposit Required
ULSTER (262.5' Truss Concrete Approach —0.12 mile)	$4,500.00
WASHINGTON (Concrete—12.61 miles)	26,000.00
WESTCHESTER (44' Dual Type Bit. Mac. M.M. Type Concrete—2.66 miles)	11,000.00
WESTCHESTER (Concrete—3.25 miles)	16,000.00
WESTCHESTER (Concrete—4.78 miles)	21,000.00

Maps, plans, specifications, and estimates may be seen and proposal forms obtained at the office of the Department in Albany, N. Y., and also at the office of the District Engineers in whose districts the roads are located, upon the payment of Five Dollars ($5.00) for plans and proposal forms. Standard specifications are Two Dollars ($2.00) per copy. Refund will not be made on plans, proposal forms or specifications. The addresses of the District Engineers and counties in each district will be furnished upon request. Plans and proposal forms may also be seen at the office of the State Department of Public Works, State Office Bldg., Worth & Center Sts., New York City.

The especial attention of bidders is called to "General Information for Bidders" in the itemized proposal, specifications, and contract agreement.

The contracts in the counties mentioned above, with the exception of Ulster County, are Employment Relief Projects. The minimum rate for unskilled labor on these contracts shall be from forty cents to fifty cents per hour, as specified in each contract, and the minimum rate for skilled labor shall be fifty cents to sixty cents per hour, as specified in each contract. Veterans of the U. S. Military Service with dependents, where qualified to do the work, shall be given preference in employment. No person, except those in supervisory, executive or administrative positions, shall be employed for more than thirty hours in any week. Details of these regulations with respect to preference in employment, use of hand labor, hours of employment, etc., will be found in the itemized proposal.

A. W. BRANDT,
Commissioner of Highways.

Bids: January 10.

Bridge

DEPARTMENT OF PUBLIC WORKS
STATE OF MARYLAND
STATE ROADS COMMISSION
Baltimore, Md.

Sealed proposals for construction of bridge as follows:

CAROLINE COUNTY, Contract Co-71-27—Bridge over Choptank River between Caroline and Talbot Counties, known as Dover Bridge, approximately 4 miles east of Easton, on the road from Easton to Preston. Superstructure consists of three (3) steel truss spans, approximately 215' each, one span of which is a swing span, providing a channel opening of 80'. Clear roadway width is 24' and the substructure is of concrete piers supported on timber piles, together with all operating equipment, operator's house, concrete pavement, electrical lighting and power system, etc.

The minimum hourly wage to be paid by the contractor on the above project shall be, for unskilled labor, $0.25; for semi-skilled labor, add 25%; for skilled labor, add 50%.

will be received by the State Roads Commission at its offices, Federal Reserve Bank Building, Calvert and Lexington Sts., Baltimore, Maryland, until 12 M. on the 10th day of January, 1933, at which time and place they will be publicly opened and read. PREQUALIFICATION OF BIDDERS REQUIRED.

Bids must be made upon the blank proposal form which, with specifications and plans will be furnished by the Commission upon application and cash payment of $1.00, for each separate project, as hereafter no charges will be permitted.

No bids will be received unless accompanied by a certified check, payable to the State Roads Commission of Maryland, as required by Sec. 6, Chapter 539, Acts of 1931, of the amount as set forth in the proposal form.

The successful bidder will be required to give bond, and comply with the Acts of the General Assembly of Maryland, respecting contracts.

The Commission reserves the right to reject any and all bids.

By order of the State Roads Commission this 21st day of December, 1932.

G. CLINTON UHL, Chairman.
L. H. STEUART, Secretary.

YOU GET national competition on your request for bids in the Official Proposal Columns of
ENGINEERING NEWS-RECORD

OFFICIAL PROPOSALS

Bids: January 19.

Alterations, Kitchen Building

STATE INSTITUTION
NAPANOCH, N. Y.
Spec. No. 7436

Sealed proposals covering Construction Work for Alterations to Present Kitchen Building, State Institution for Defective Delinquents, Napanoch, N. Y., in accordance with Specification No. 7436 and accompanying drawings, will be received by the Commissioner of Correction, State Office Building, Albany, N. Y., until 2 o'clock p.m. (Eastern Standard Time) on Thursday, January 19, 1933.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, State Office Building, New York City.

Commissioner of Architecture, State Office Building, Albany, N. Y.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

State Institution for Defective Delinquents, Napanoch, N. Y.

Drawings and specifications may be obtained from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon a payment of $5.00 for each set of drawings and specifications. Proposal blanks and envelopes will be furnished without charge.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.
Dated: 12-12-32.

U. S. Government

(U. S. Govt. ads continued from page 29)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 14, 1932.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 11, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office, etc., at East Greenwich, R. I.* The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (253)

U. S. ENGINEER OFFICE, Mobile, Ala.—Sealed bids, in duplicate, subject to the conditions contained in the specifications, will be received until 11 o'clock a.m., January 6, 1933, and then publicly opened, for furnishing all labor and materials and performing all work of *dredging* approximately 3,000,000 cubic yards of material, including overdepth, *from Gulfport Ship Channel, Mississippi.* Further information on application. (256)

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 20, 1933—Sealed bids, in duplicate subject to the conditions containd herein, will be publicly opened in this office at 3 p.m., January 17, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office, etc., at Ambridge, Pa.* The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished Builders' Exchanges, Chambers of Commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (266)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 22, 1932.—Sealed bids in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., February 2, 1933, for furnishing all labor and materials and performing all work for two new vault entrances and relocating two *vault entrances for the U. S. treasury building, Washington, D. C.* The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). In awarding the contract, consideration will be given only to manufacturers of vault entrance equipment who have previously furnished and installed work comparable in all respects with that for which the bid is submitted, and who can, if so requested, show evidence that they performed such work in a satisfactory manner. Drawings and specifications may be obtained at this office in the discretion of the supervising architect. JAS. A. WETMORE, Acting Supervising Architect. (264)

SEALED PROPOSALS in triplicate will be received by the Constructing Quartermaster, Army Medical Center, Washington, D. C., until 2:00 p.m., January 20, 1933, and then publicly opened, for the construction of Section G, *completion of Sections A & E, addition of porch to Section B and miscellaneous work and repairs in Section F and East Wing of Nurses' Quarters and the construction of Non-commissioned Officers' Apartments.* Information and specifications may be obtained upon application to the above office. Deposit of $100.00 (certified check) required for plans. (267)

OFFICE OF THE CONSTRUCTING QUARTERMASTER, Fort Lewis, Washington:—Sealed bids, in triplicate, for the *construction of Cast Iron Water Mains at Fort Lewis, Washington,* will be received at the office of The Constructing Quartermaster, Fort Lewis, Washington, until 10.30 a.m., Pacific Standard Time, January 24, 1933, and then publicly opened. Plans and specifications may be obtained from this office upon deposit of a certified check made payable to the "Treasurer of The United States" in the amount of $10.00. (262)

UNITED STATES ENGINEER OFFICE, Room 710, Army Building, 39 Whitehall St., New York, N. Y.—Sealed bids will be received until 12 M., January 10, 1933, and then publicly opened, for furnishing all labor and materials and performing all work for *dredging* approximately 1,797,000 cubic yards of material in the *Hudson River, N. Y.*, at Parda Hook, at the Hudson River Connecting Railroad Bridge south of Castleton, opposite New Baltimore, at East Flats Light, opposite Coxsackie Island, at Nutten Hook, at Welch's Ice House Dock, at Stockport Middle Ground, opposite the City of Hudson, and opposite Germantown, located approximately 6.6, 10.0, 14.5, 19.5, 20.2, 21.1, 22.5, 23.7, 28.0 and 39.0 miles respectively south of Albany, N. Y. (254)

U. S. Government

PROPOSALS FOR FIRE HOUSE, Q. M. Maintenance Building and Completion of Q. M. Garage. Office of Constructing Quartermaster, Langley Field, Virginia. Sealed proposals will be received here until 11 a.m. January 5, 1933, and then opened for *construction of Fire House, Q. M. Maintenance Building and Completion of Q. M. Garage at Langley Field, Virginia.* Deposit check $25.00 payable to Treasurer of United States required for plans and specifications. Further information on application. (241)

U. S. ENGINEER OFFICE, P. O. Box 59, Louisville, Ky.—Sealed bids will be received until 2:00 p.m. (C.S.T.), January 27, 1933, and then publicly opened, for furnishing all labor and materials and performing all work for *constructing a lock at Lock and Dam No. 1, Barren River at Greencastle, Ky.*, about 15 miles below Bowling Green, Ky. Deposit required for plans, $25.00. Further information on application. (265)

U. S. ENGINEER OFFICE, Rock Island, Illinois.—Sealed proposals, in duplicate, will be received until 2:00 p.m., January 10, 1933, and then publicly opened, for furnishing all plant, labor and material and performing all work for *repairing the C. R. I. & P. Railway bridge over the Illinois and Mississippi Canal at Lock No. 6, between Bureau and Tiskilwa, Illinois.* Further information on application. (261)

WAR DEPARTMENT—Office Constructing Quartermaster San Antonio, Texas and vicinity, Fort Sam Houston, Texas.—Sealed proposals will be received in this office until 10 a.m., January 13, 1933, and then opened, for the *construction of Twenty-One Company and Three Field Officers Quarters at Fort Sam Houston, Texas.* $25.00 deposit required for plans and specifications. (257)

U. S. ENGINEER OFFICE, Dertoit, Mich.—Sealed bids, in duplicate, will be received until 11:00 o'clock a.m., Eastern Standard Time, January 6, 1933, for *dredging* about 1,717,400 cubic yards of material from ship channel in upper end of *Lake St. Clair, Mich.* Further information on application. (248)

U. S. ENGINEER OFFICE. Milwaukee, Wis.—Sealed bids will be received until 3 p.m., January 11, 1933, and then publicly opened for *constructing concrete superstructure on piers at Sheboygan, Wis.* (242)

U. S. ENGR. OFFICE, Providence, R. I. Sealed bids will be rec'd here until 2 p.m., Jan. 5, 1933, for *removing wreck of Str. Grecian*, sunk in Atlantic Ocean about *5 mi. south of Block Id. S. E. Lighthouse, Block Id., R. I.* (2412)

U. S. ENGINEER OFFICE, P. O. Box 59, Louisville, Ky. Sealed bids will be received until 2:00 p.m., Central Standard Time, January 5, 1933, and then publicly opened, for furnishing all labor and materials, and performing all work for *constructing Lock and Dam No. 5, Green River, Kentucky*, approximately 168 miles above the mouth and 12 miles below Brownsville, Kentucky, and approximately 15 miles from Bowling Green, Ky. Further information on application. A deposit of $25.00 is required for plans. (232)

U. S. ENGINEER OFFICE, NORFOLK, VA.—Sealed bids will be received here until 3:00 p.m., Jan. 3, 1933, and then publicly opened, for *dredging approximately 2,432,400 cu.yds.* of material at *Aiken Swamp-Dutch Gap Cut-offs in James River, Va.* Further information on application. (2410)

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Moretrench Corporation
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Nash Engineering Co.

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(See Searchlight Section)

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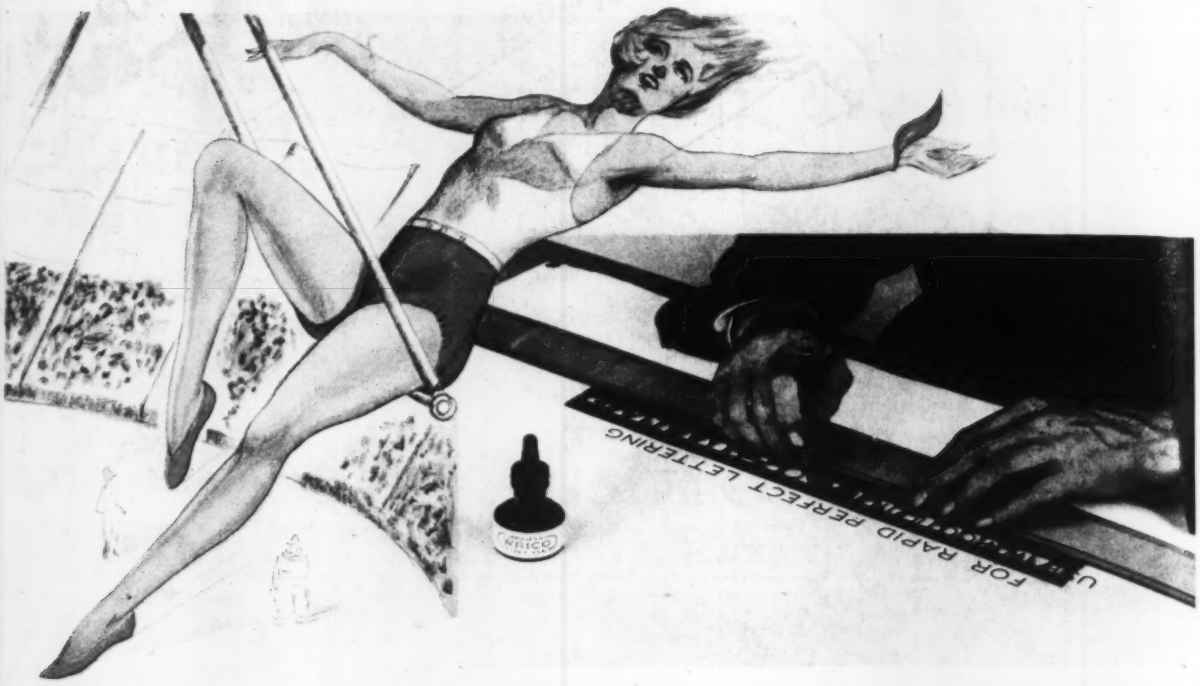

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